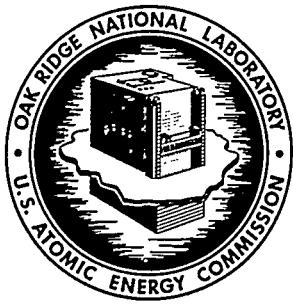


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ORNL
CENTRAL FILES NUMBER

72-9-18

DATE: September 14, 1972

SUBJECT: Radioactive Waste Disposal Operations Report
for the Month of July, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David C. Horwitz 3/13/96
Technical Information Officer
ORNL, Site

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Union Carbide Corporation, Nuclear Division.

LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of July, 1972, was 0.185% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.138% MPC_W, 0.03% MPC_W, and 0.015% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.8 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ⁹⁰Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 263 gph. A summary of operating data follows:

	<u>Gallons</u>
Total volume generated	167,000
Volume transferred to evaporator	196,000
Tank Farm free space at beginning of month	223,400
Tank Farm free space at end of month	245,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture	302,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	34,700
Fission Products Development Laboratory	24,800
ORR and BSR	15,900
High Flux Isotope Reactor	17,000
Radioisotopes Processing Area	30,900
4500 Complex	7,000
Transuranium Processing Area	11,500

GASEOUS WASTE

The ORNL stacks discharged 50 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 77 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.1% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

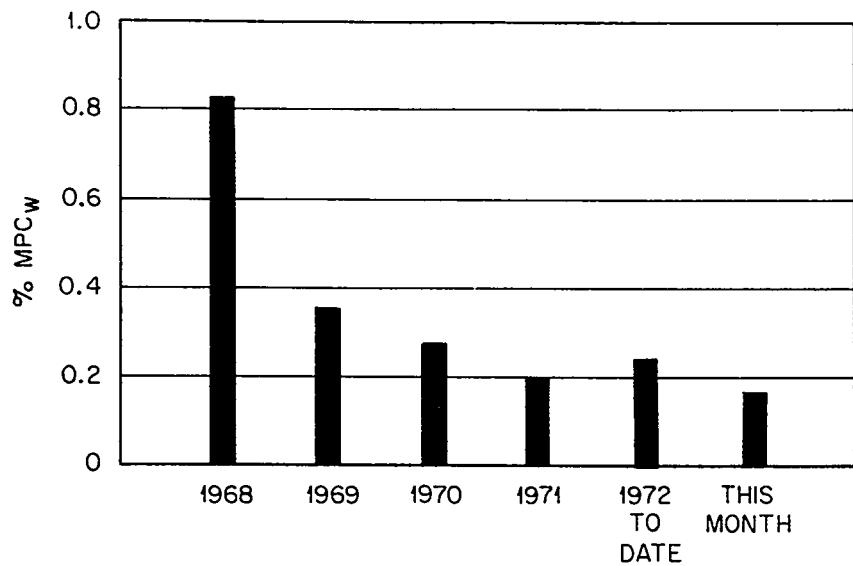


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

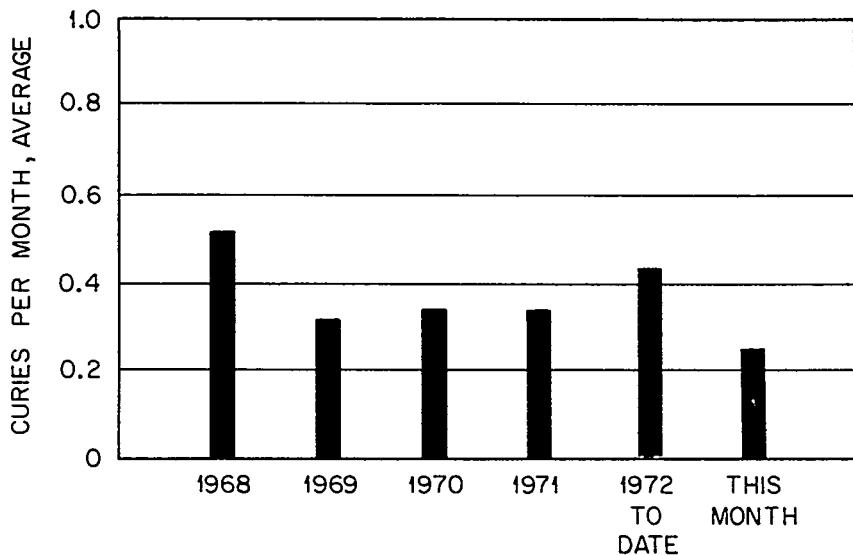


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

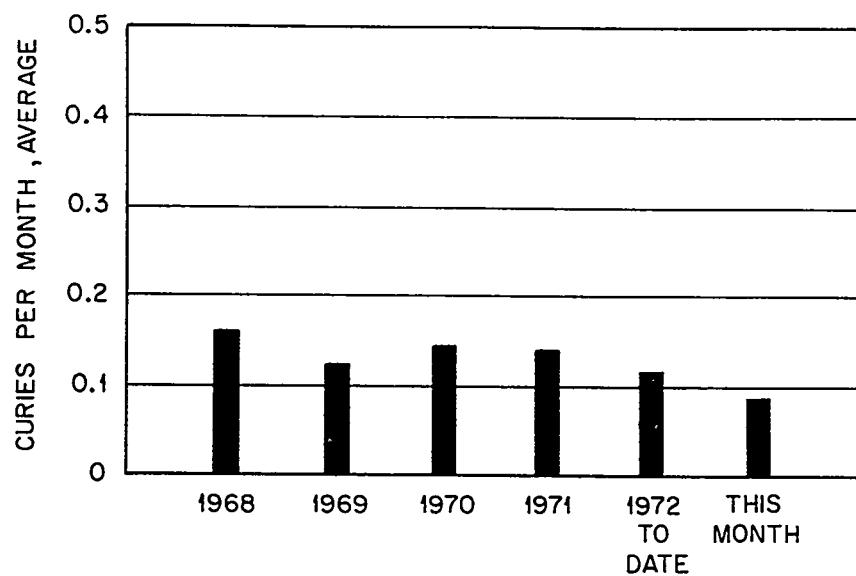


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

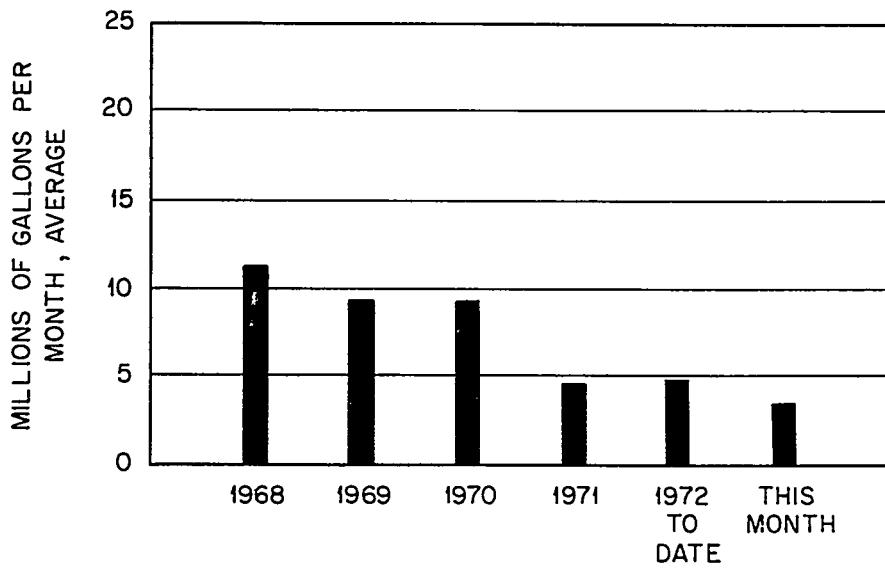


Fig 4. Process Waste Volumes.

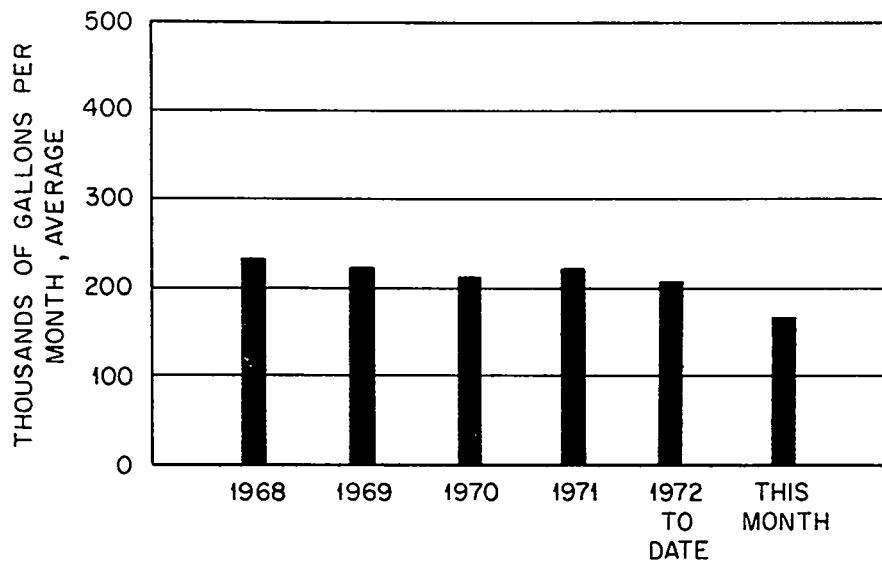


Fig 5. Intermediate - Level Waste Volumes.

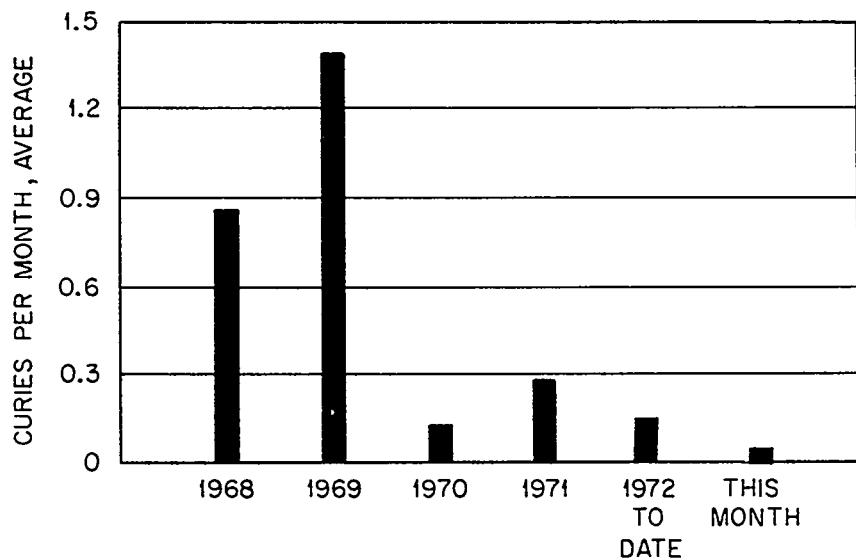


Fig 6. Total Activity Released in Gaseous Waste (Mainly I^{131} ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

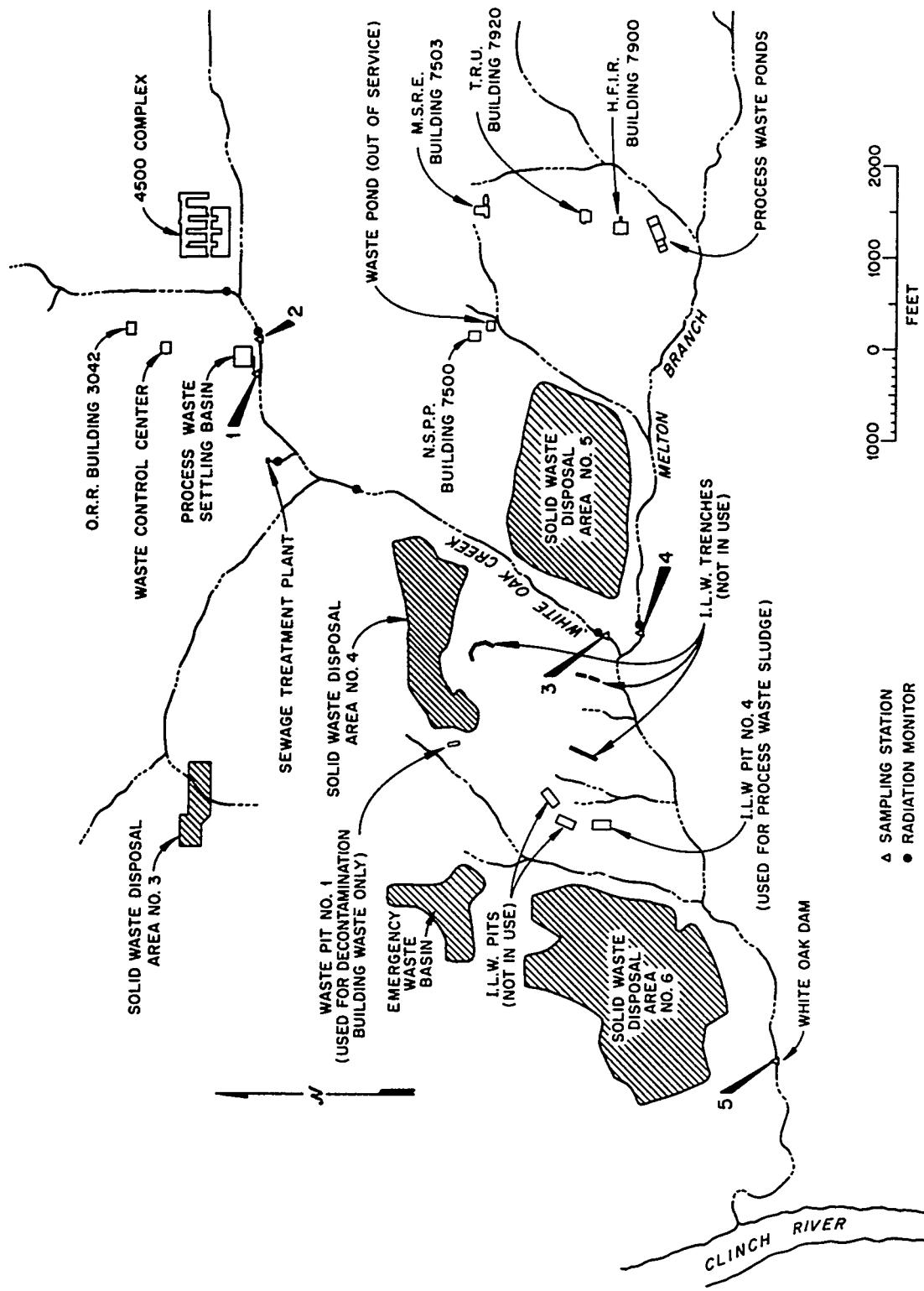


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.09	0.18
Miscellaneous discharges from east end of plant	2	0.02	-
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.23	0.50
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.03	0.06
Total discharge from all sources	3,4	0.26	0.56
White Oak Dam to Clinch River (Health Physics measurement)	5	0.15	0.35

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m ^a	Curies Total	90 Sr		Volume Million Gallons	% of Total
			% of Total	Volume Million Gallons		
1. Radioisotopes Processing Area (MH234)	132	0.02	3.1	0.06	1.1	
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.42 ^b	65.6	0.97	17.8	
3. Reactor Operations (MH112)	9.6	< 0.01	-	0.40	7.3	
4. Buildings 3503 and 3508	19.4	0.06	9.4	1.07	19.6	
5. Buildings 3025 and 3026	11.2	< 0.01	-	0.26	4.8	
6. Building 3019	17.6	< 0.01	-	0.02	0.4	
7. Fission Products Development Laboratory	-	< 0.01	-	0.01	0.2	
8. Waste Evaporator, Bldg. 2531	42	0.04	6.2	0.92	16.9	
9. Buildings 3525 and 3550	< 0.01	< 0.01	-	0.87	16.0	
10. Building 2026	0.5	< 0.01	-	0.16	2.9	
11. Tank Farm Drainage	54	0.10	15.7	0.71	13.0	

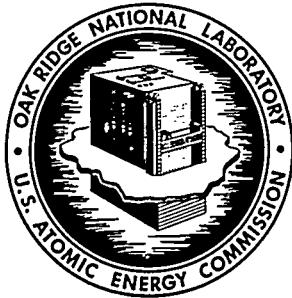
^aCounted at 30% geometry.^bThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)	
			12	12
HRLAI		2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.03	41	
Radiochemical-Processing Pilot Plant	3020	0	3	
MSRE	7512	0	0	
HFIR	7911	0.02	33	
Total activity in gases released		0.05	77	

^aActivity primarily ^{131}I as noted in text.

^bThese values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.



DATE REC'D DEC 4 1972

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OAK RIDGE NATIONAL LABORATORY

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Special Distribution

ORNL 
CENTRAL FILES NUMBER

72-11-34

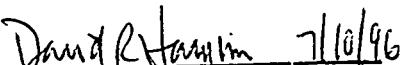
DATE: November 27, 1972

SUBJECT: Radioactive Waste Disposal Operations Report
for the Month of October, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:


David R. Hamilton 7/10/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of October, 1972, was 0.42% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.34% MPC_W, 0.05% MPC_W, and 0.01% MPC_W, respectively. The higher than normal percentage discharge for the month resulted from a low flow in the Clinch River.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 5.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ⁹⁰Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 228 gph. A summary of operating data follows:

	<u>Gallons</u>
Total volume generated	197,000
Volume transferred to evaporator	170,000
Tank Farm free space at beginning of month	333,000
Tank Farm free space at end of month	440,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture	107,000
Volume of concentrate transferred to Shale Fracture	141,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	19,900
Fission Products Development Laboratory	26,400
ORR and BSR	17,400
High Flux Isotope Reactor	33,400
Radioisotopes Processing Area	31,100
4500 Complex	6,300
Transuranium Processing Area	19,400

SHALE FRACTURING DISPOSAL OF ILW, INJECTION 9

ILW injection No. 9 was made on October 17, 1972, through the existing slot at a depth of 832 feet. A total of 68,300 gallons of concentrated ILW was injected into the fractured shale formation.

This waste contained 23,740 curies of ^{137}Cs , 235 curies of ^{90}Sr , 380 curies of ^{106}Ru , a trace of ^{60}Co , 1.16 grams of ^{239}Pu , and 0.07 grams of ^{244}Cm . Materials used for the injection are listed below.

The slurries are in the order of their injection.

<u>Solids</u>	<u>Weight, lb</u>	<u>lb/gal</u>
Portland cement, Type 1	231,000	3.1
Kingston fly ash	230,000	3.0
Attapulgite	90,000	1.2
Grundite	<u>45,000</u>	<u>.6</u>
Total weight of Solids	596,000	7.9

<u>Liquids for Slurry</u>	<u>Gallons</u>
Waste pit water	4,030
ILW	68,300
Fresh water	2,250
Water (displacement of well)	<u>840</u>
Total volume	75,420

Additional information concerning the injection is given in a memo from H. O. Weeren to Distribution, "Preliminary Results at Hydro-fracture Injection ILW-9", November 10, 1972.

GASEOUS WASTE

The ORNL stacks discharged 60 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 260 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.7% and 0.6% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

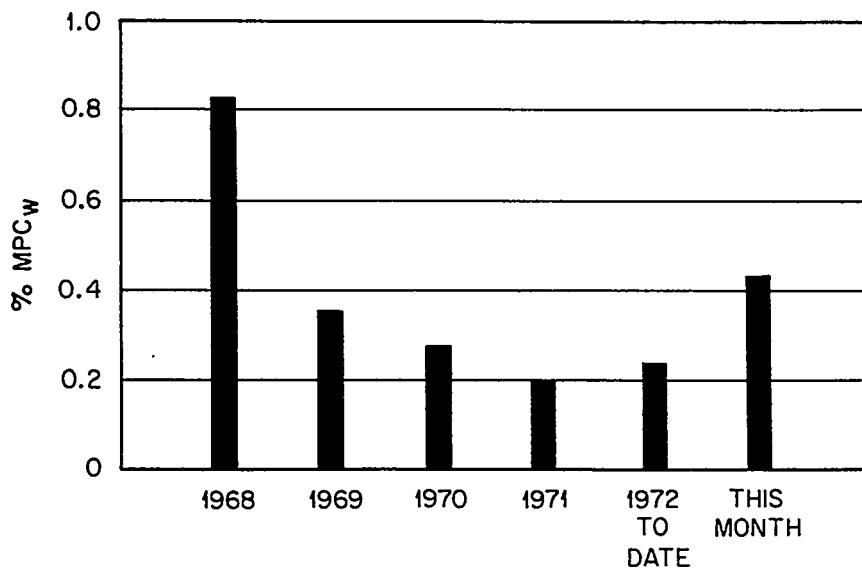


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

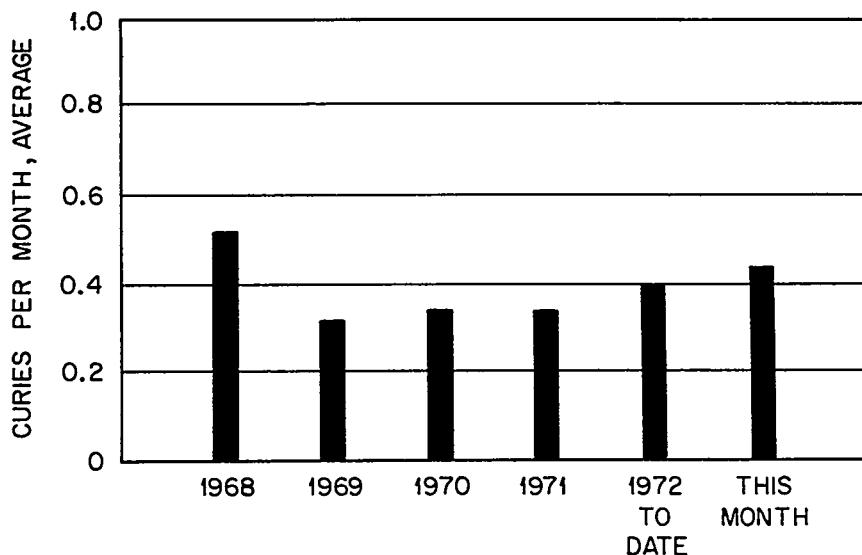


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7.).

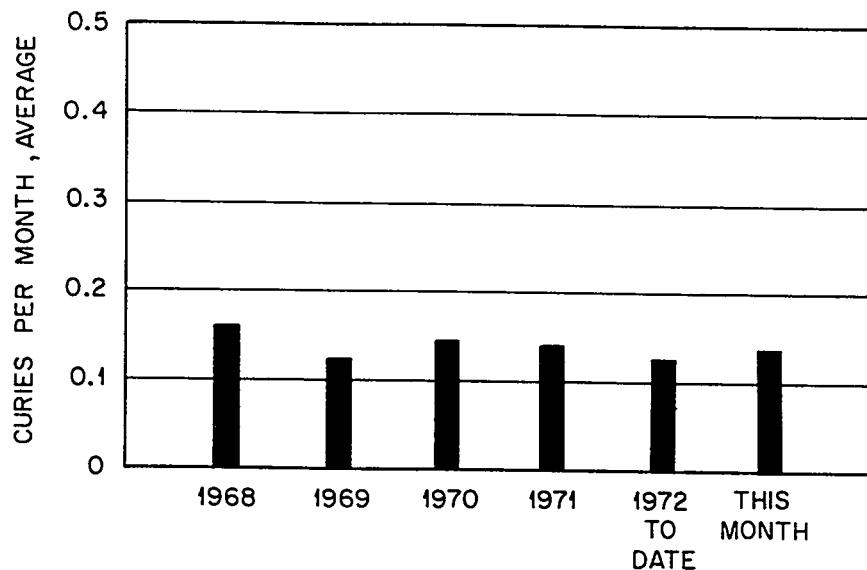


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

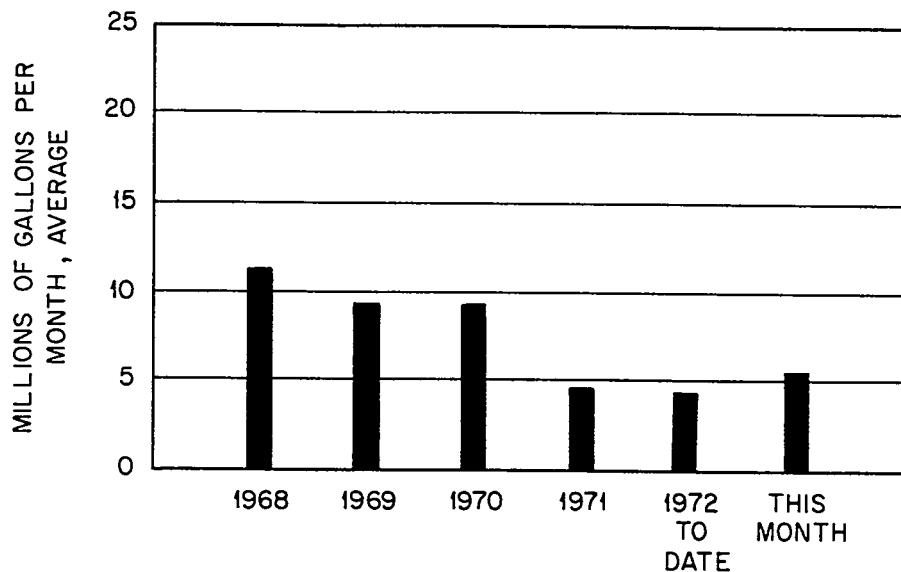


Fig 4. Process Waste Volumes.

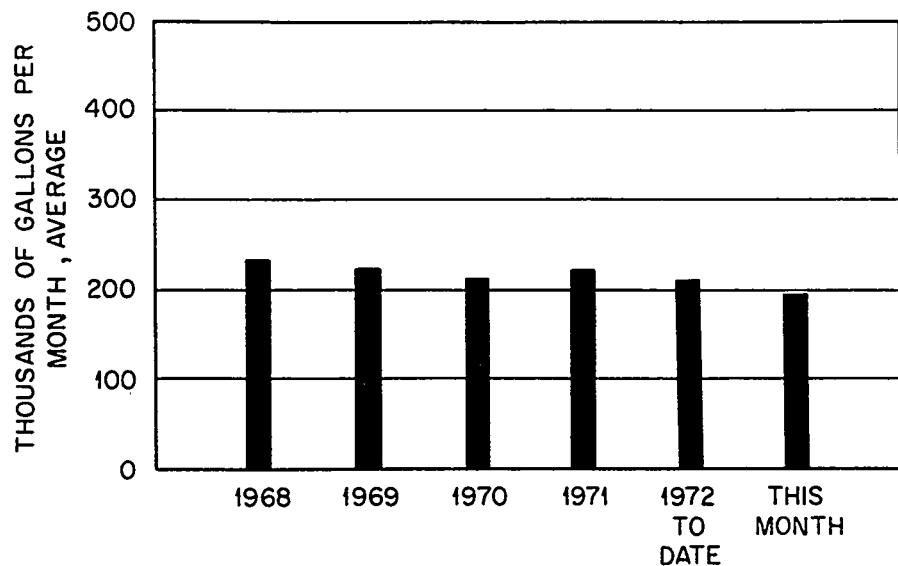


Fig 5. Intermediate - Level Waste Volumes.

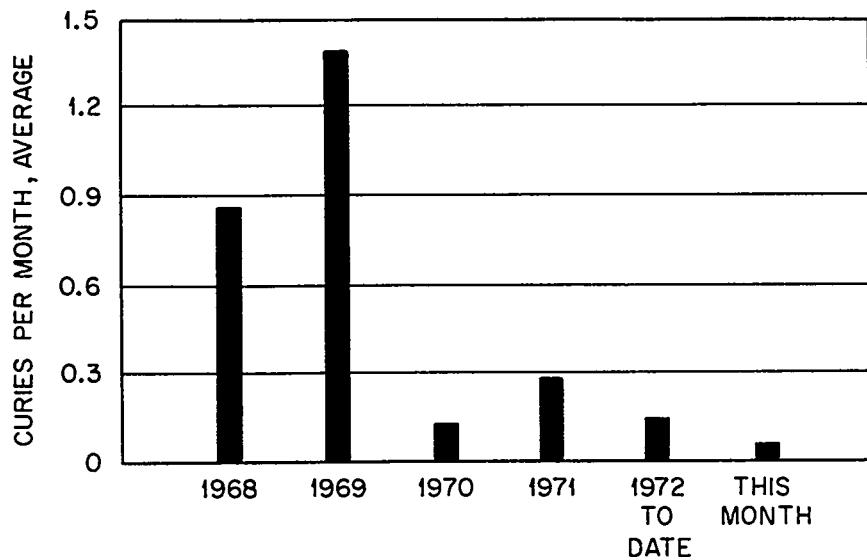


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

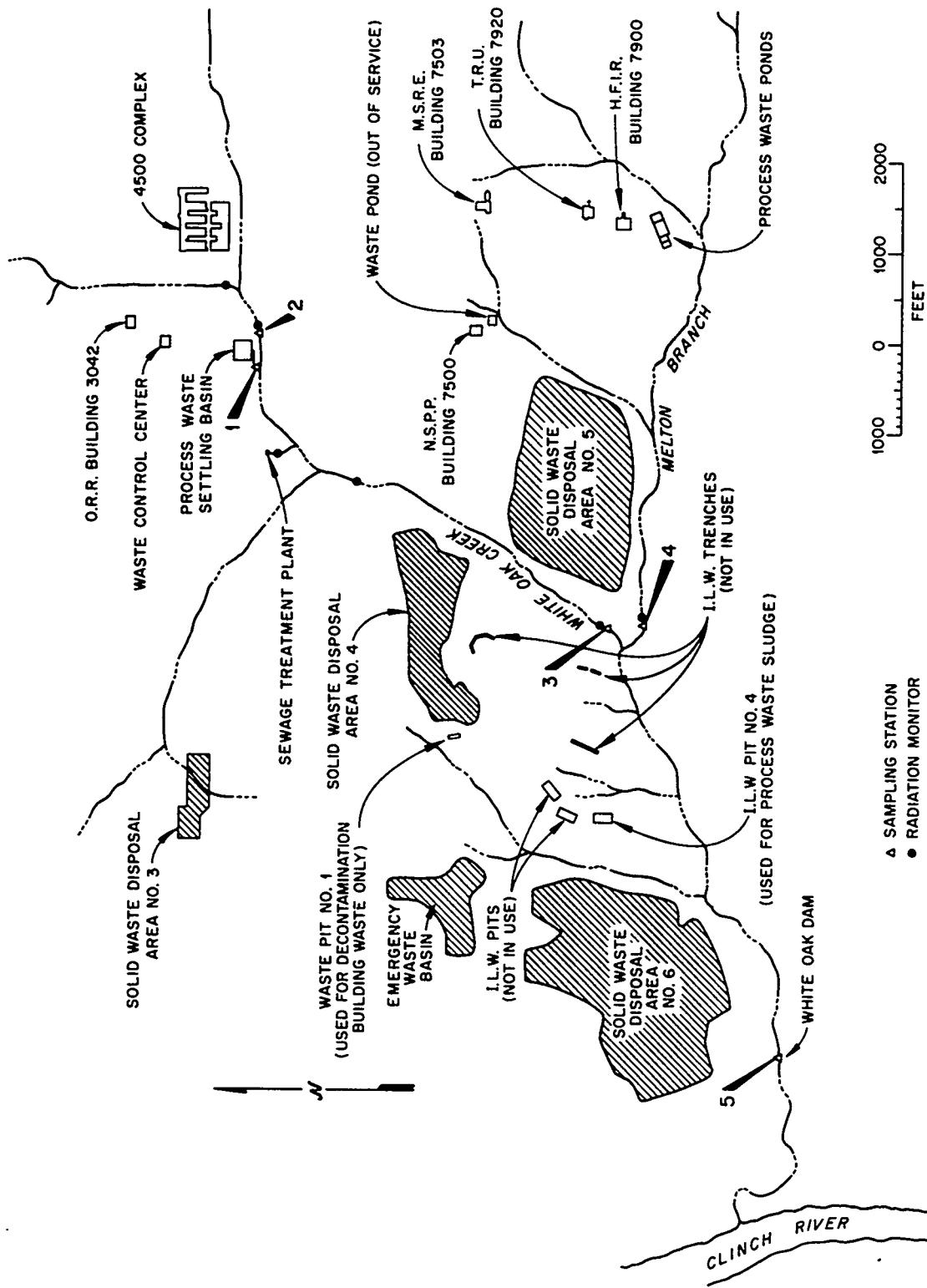


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.14	0.29
Miscellaneous discharges from east end of plant	2	0.04	0.08
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.38	0.85
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.05	0.27
Total discharge from all sources	3,4	0.43	1.12
White Oak Dam to Clinch River (Health Physics measurement)	5	0.30	1.10

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m ³ ^a	⁹⁰ Sr Curies	% of Total	Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	69.0	0.04	5.9	0.26	4.6
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.33 ^b	48.5	0.61	10.8
3. Reactor Operations (MH112)	8.5	<0.01	-	0.47	8.3
4. Buildings 3503 and 3508	17.8	0.07	10.3	1.13	19.9
5. Buildings 3025 and 3026	5.9	<0.01	-	0.80	14.1
6. Building 3019	18.1	<0.01	-	0.04	0.7
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4
8. Waste Evaporator, Bldg. 2531	36.0	0.04	5.9	0.49	8.6
9. Buildings 3525 and 3550	< 0.05	<0.01	-	0.76	13.4
10. Building 2026	0.20	<0.01	-	0.19	3.3
11. Tank Farm Drainage	90.0	0.20	29.4	0.90	15.9

^aCounted at 30% geometry.^bThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Filterable Activity ^a (Curies)		Particulate Activity ^b (Microcuries)
		0	0	
HRLAL	2026	0	0	0
Central Radioactive Gas Disposal Facilities	3039	0.05	179	
Radfochemical-Processing Pilot Plant	3020	0	3	
MSRE	7512	0	0	
HFIR	7911	0.01	78	
Total activity in gases released		0.06	260	

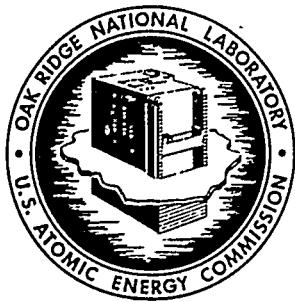
^aActivity primarily ^{131}I as noted in text.

^bThese values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

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ORNL
CENTRAL FILES NUMBER

73-1-25

DATE: January 19, 1973

SUBJECT: Radioactive Waste Disposal Operations Report
for the Month of November, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

Chemical Document No. 2195

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1972, was 0.26% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.19% MPC_W, 0.05% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. There is no obvious reason for the higher-than-normal discharge shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ⁹⁰Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 274 gph. A summary of operating data follows:

	<u>Gallons</u>
Total volume generated	162,000
Volume transferred to evaporator	197,000
Tank Farm free space at beginning of month	440,000
Tank Farm free space at end of month	540,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	36,000
Volume of concentrate transferred to Shale Fracture	71,000
Total volume of concentrate in storage	82,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	28,200
Fission Products Development Laboratory	15,400
ORR and BSR	14,500
High Flux Isotope Reactor	13,900
Radioisotopes Processing Area	30,900
4500 Complex	8,300
Transuranium Processing Area	4,900

SHALE FRACTURING DISPOSAL OF ILW, INJECTION 10

ILW injection No. 10 was made on November 8, 1972, through the existing slot at a depth of 832 feet. A total of 82,400 gallons of concentrated ILW was injected into the fractured shale formation.

This waste contained 18,213 curies of ^{137}Cs , 1,290 curies of ^{90}Sr , 579 curies of ^{106}Ru , 47 curies of ^{60}Co , 5.9 grams of ^{239}Pu , and 0.3 grams of ^{244}Cm . Materials used for the injection are listed below.

The slurries are in the order of their injection.

<u>Solids</u>	<u>Weight, lb</u>	<u>lb/gal</u>
Portland cement, Type 1	279,300	3.1
Kingston fly ash	236,100	2.6
Attapulgite	108,000	1.2
Grundite	<u>54,000</u>	<u>0.6</u>
Total weight of Solids	677,400	7.5

<u>Liquids for Slurry</u>	<u>Gallons</u>
Waste pit water	7,000
ILW	82,400
Fresh water	<u>1,000</u>
Total volume	90,400

Additional information concerning the injection is given in a memo from H. O. Weeren to Distribution, "Preliminary Results of Hydro-fracture Injection ILW-10, December 22, 1972.

GASEOUS WASTE

The ORNL stacks discharged 160 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 354 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.8% and 0.9% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

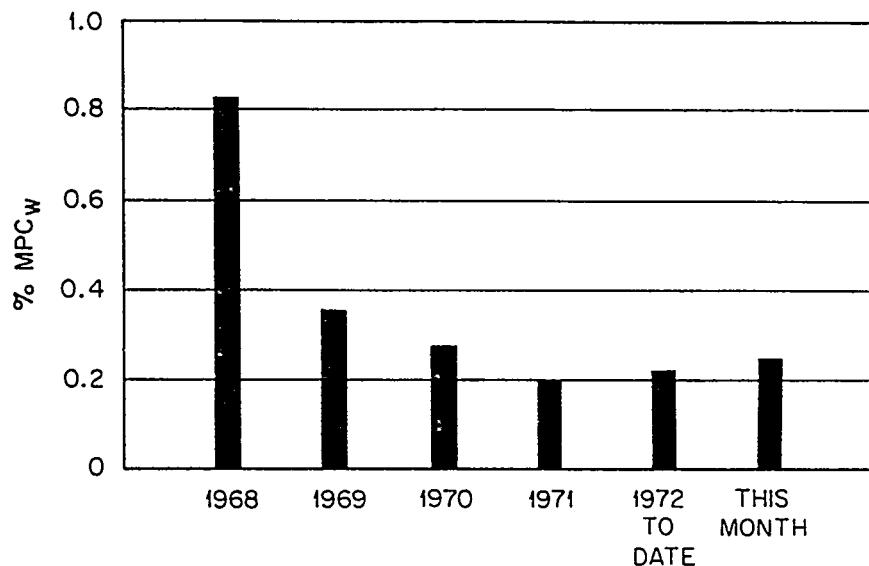


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

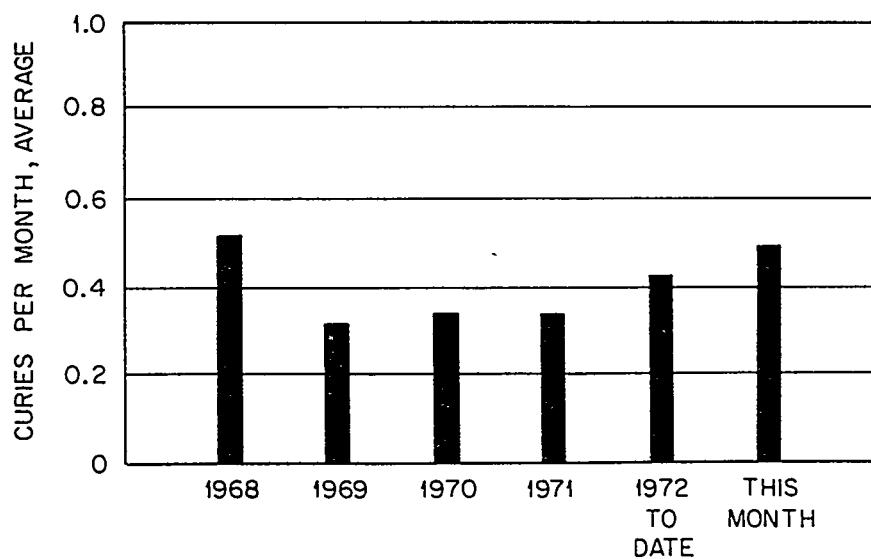


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

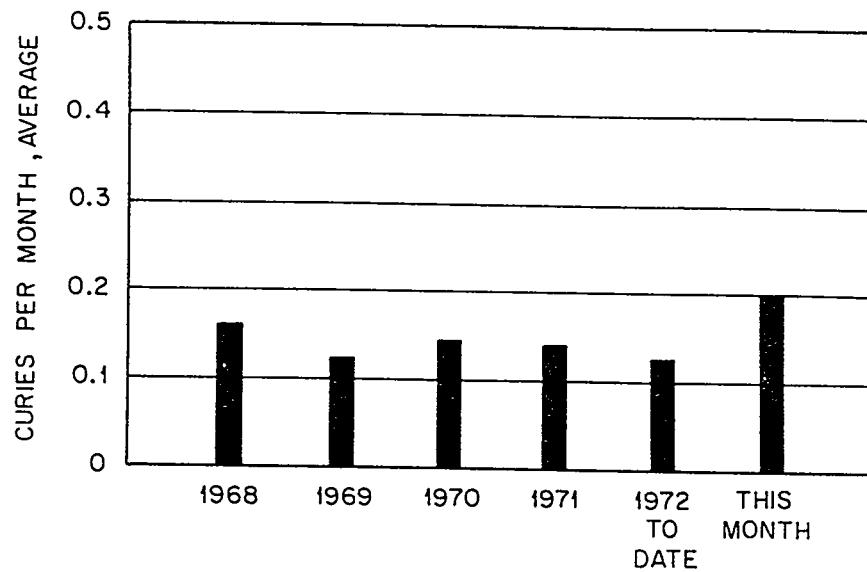


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

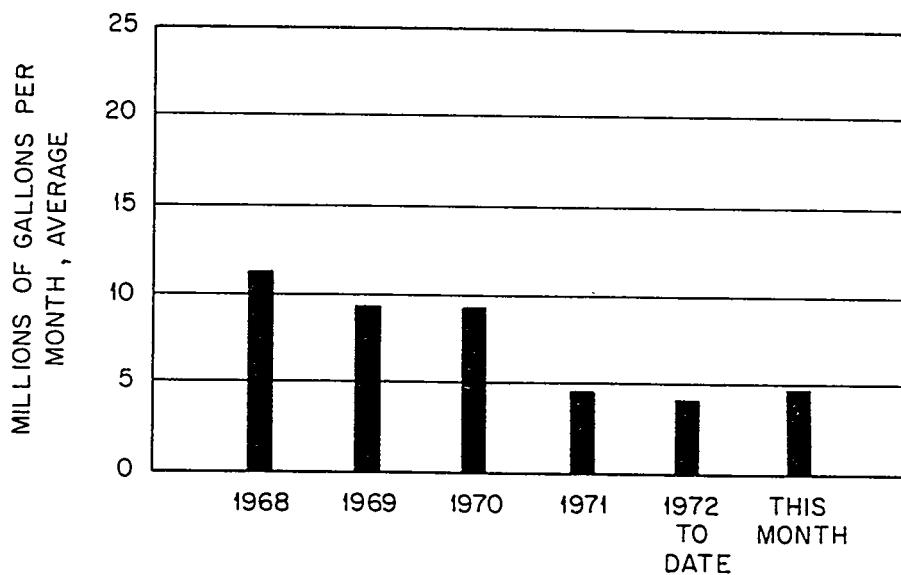


Fig 4. Process Waste Volumes.

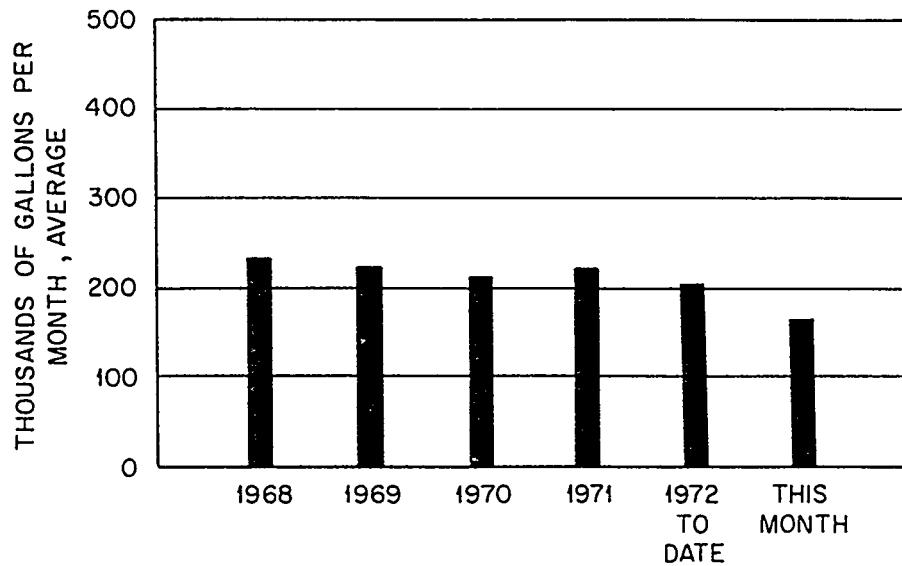


Fig 5. Intermediate - Level Waste Volumes.

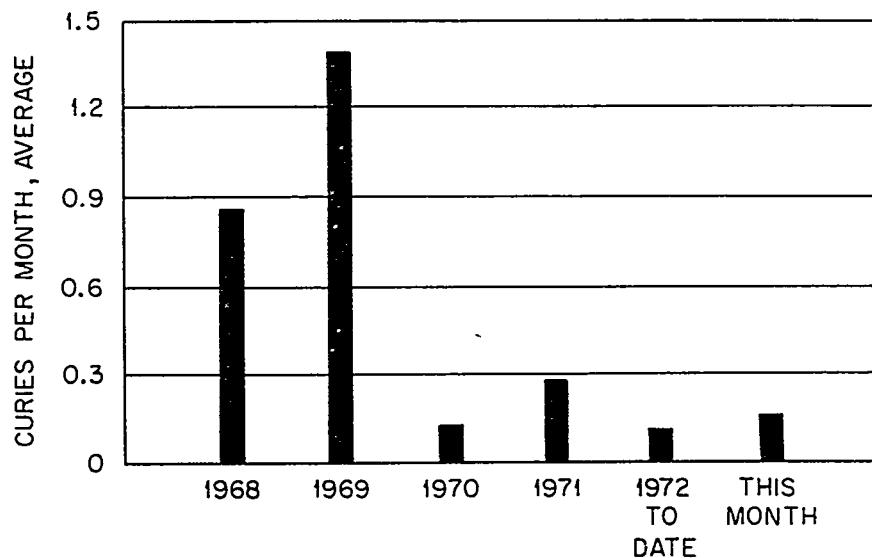


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

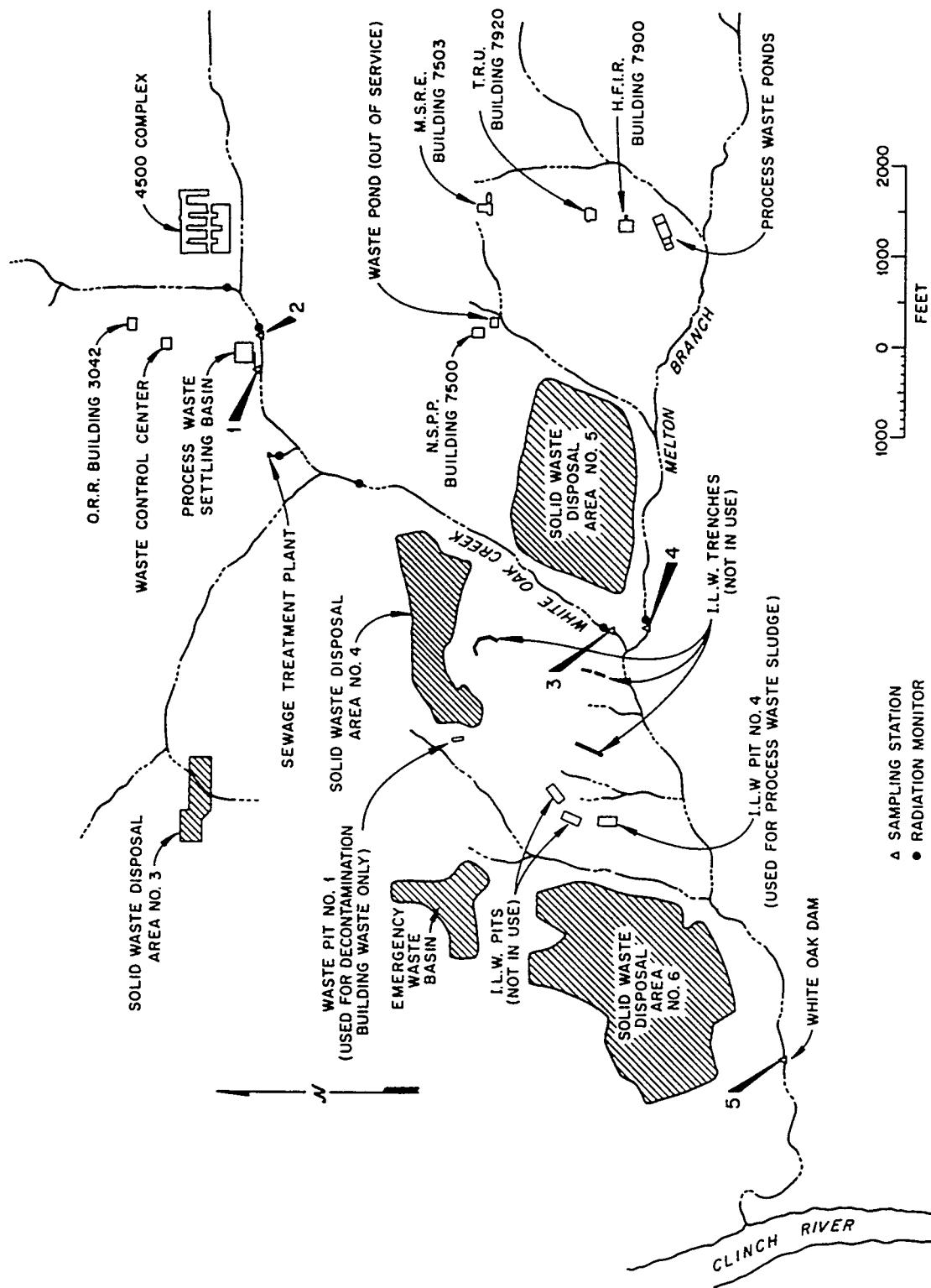


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.20	0.37
Miscellaneous discharges from east end of plant	2	0.02	0.07
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.42	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.08
Total discharge from all sources	3,4	0.50	0.88
White Oak Dam to Clinch River (Health Physics measurement)	5	0.29	0.67

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

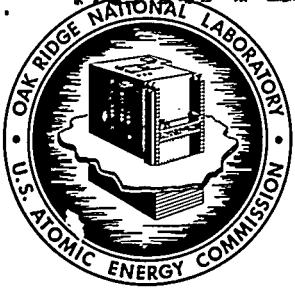
	Activity Average c/m/ml ^a	Gross-Beta Curies	⁹⁰ Sr		Volume Million Gallons	% of Total
			% of Total	Million Gallons		
1. Radioisotopes Processing Area (MH234)	108	0.02	3.6	0.14	2.6	
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.27 ^b	49.1	0.33	6.0	
3. Reactor Operations (MH112)	4.4	<0.01	-	0.59	10.8	
4. Buildings 3503 and 3508	11.2	0.03	5.5	1.05	19.2	
5. Buildings 3025 and 3026	4.5	<0.01	-	0.66	12.1	
6. Building 3019	5.2	<0.01	-	0.11	2.0	
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4	
8. Waste Evaporator, Bldg. 2531	348	0.17	30.9	0.70	12.8	
9. Buildings 3525 and 3550	<0.05	<0.01	-	0.82	15.0	
10. Building 2026	0.08	<0.01	-	0.15	2.7	
11. Tank Farm Drainage	102	0.06	10.9	0.90	16.4	

^aCounted at 30% geometry.^bThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)	
			13	0
HRLAL	2026	0		
Central Radioactive Gas Disposal Facilities	3039	0.14		170
Radiochemical-Processing Pilot Plant	3020	0		17
MSRE	7512	0		0
HFIR	7911	0.02		167
Total activity in gases released		0.16		354

^aActivity primarily ^{131}I as noted in text.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.



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CENTRAL FILES NUMBER

73-3-25

DATE: March 20, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Lyman 10/24/95
Technical Information Officer
ORNL Site Date

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of January, 1973, was 0.46% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.38% MPC_W, 0.06% MPC_W, and 0.012% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The high ⁹⁰Sr discharge noted in Table 1 and Figures 2 and 3 is a carry-over from the accidental release reported in the December, 1972, report.

Process Waste

A total of 4.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ⁹⁰Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 177 gph. The evaporator was down 336 hours for in-cell maintenance and consequently, the volume of waste transferred to the evaporator was less than normal.

	<u>Gallons</u>
Total volume generated	161,000
Volume transferred to evaporator	132,000
Tank Farm free space at beginning of month	505,000
Tank Farm free space at end of month	470,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	41,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	35,800
Fission Products Development Laboratory	15,700
ORR and BSR	19,200
High Flux Isotope Reactor	29,700
Radioisotopes Processing Area	14,900
4500 Complex	5,700
Transuranium Processing Area	4,300

Gaseous Waste

The ORNL stacks discharged 210 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 896 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.4% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

A program for monitoring and reporting nonradioactive pollutants in White Oak Creek and Melton Branch (Stations 3 and 4 on Figure 7) was started in December, 1972. The pH, the dissolved oxygen content and the temperature of the two streams are monitored continuously and the measurements are recorded in the Building 3105 control room. The chemical monitoring is done by collecting weekly composites (proportional to the creek flow) of the creek water at each of the sampling stations. These composites are then analyzed for the pollutants that the Industrial Hygiene Department considers necessary to monitor.

The results of the pH, the oxygen content and the temperature measurements are summarized in Table 4. As can be noted, the pH of White Oak Creek was out of compliance with the standards fifty times and the pH for Melton Branch was out of compliance only twice. The dissolved oxygen content and the temperature of the two streams were in compliance the entire month. The pH problems are being caused by discharges from the Steam Plant water softeners and the reactor water demineralizers in Building 3004. An engineering design is being prepared for installation of a pond and auxiliary equipment for controlling the discharges from the Steam Plant. A study is also being made to determine the best method for controlling the discharges from the reactor water demineralizers.

Tables 5A and 5B present the results of the chemical monitoring; Table 5A presents the data for December, 1972, and Table 5B presents the data for the current month. It is anticipated that some of the chemicals currently being monitored will be dropped from the list when sufficient analyses have been obtained to show that they do not present a problem. If there is reason to suspect other chemicals, they will be added to the monitoring list.

The chromates and phenols are released from the ORR and HFIR cooling towers. Equipment for recycling the HFIR cooling tower blowdown is scheduled for installation next spring. If this equipment successfully eliminates the chromate and phenol release to the creek, similar equipment will be installed at the ORR tower.

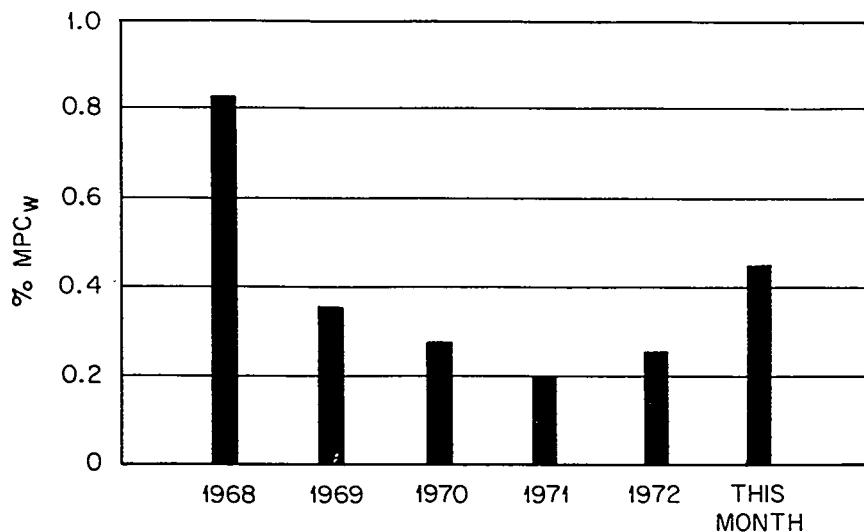


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

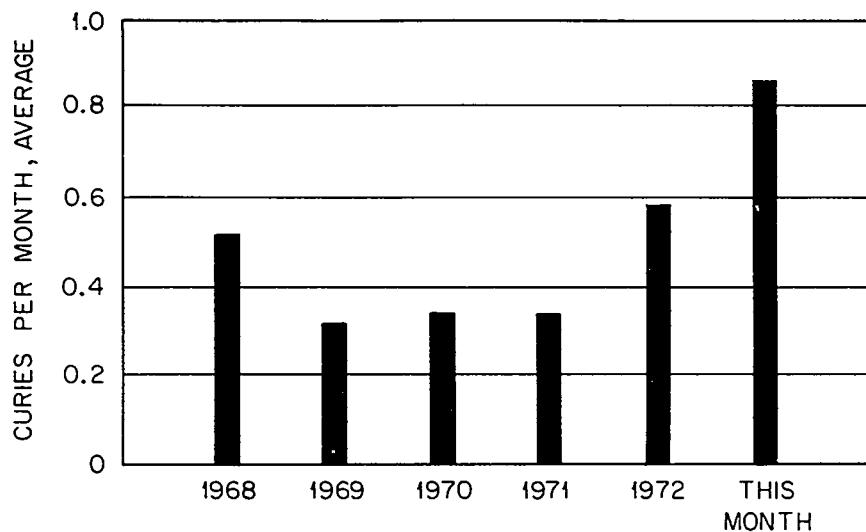


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

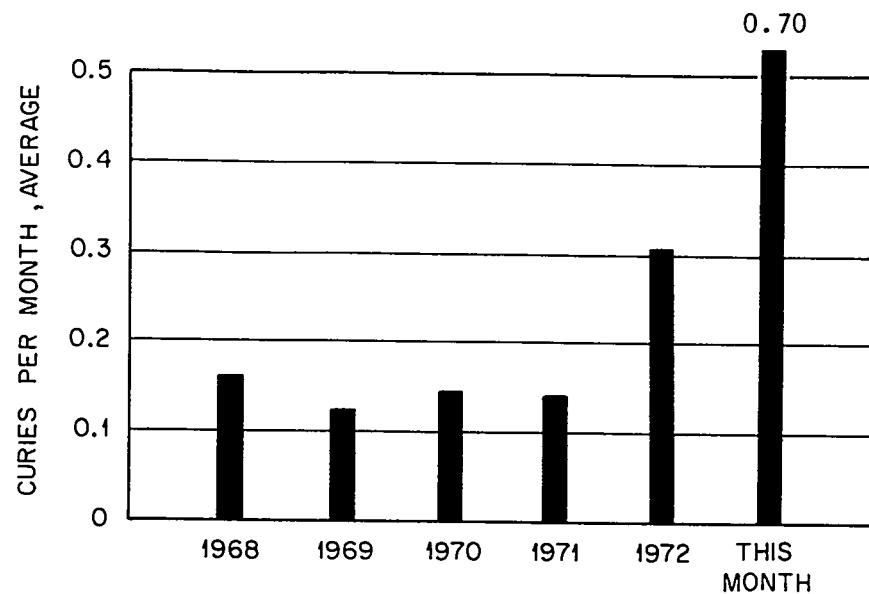


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

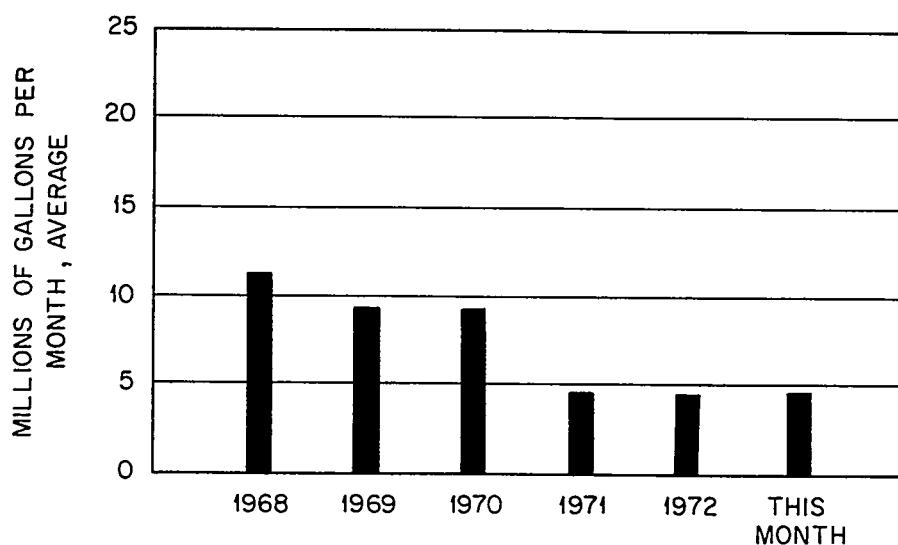


Fig 4. Process Waste Volumes.

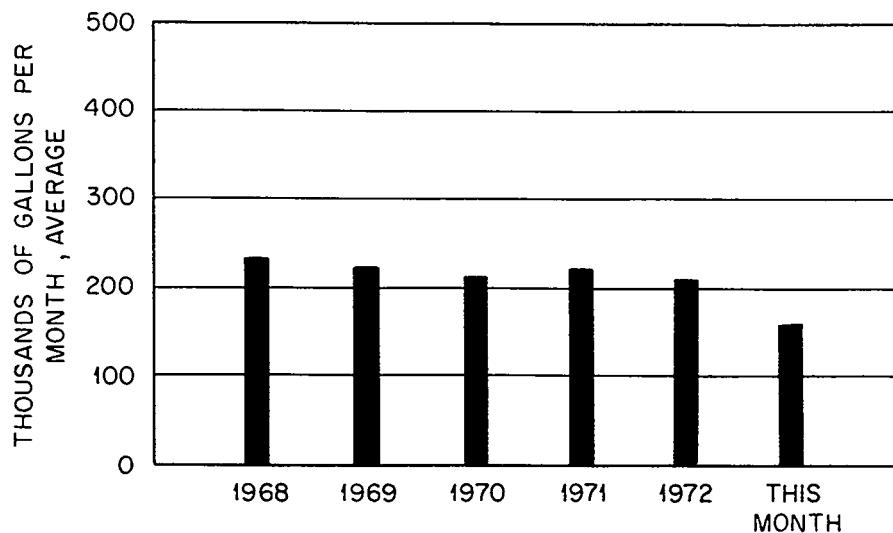


Fig 5. Intermediate - Level Waste Volumes.

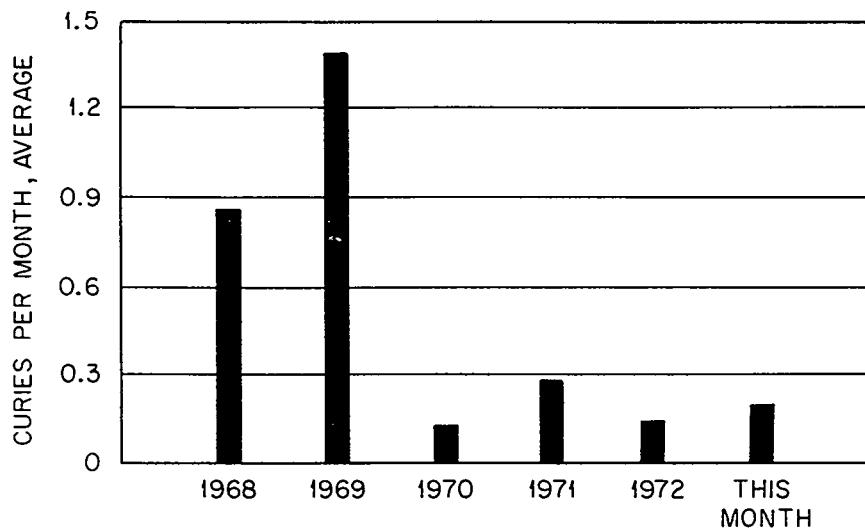


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

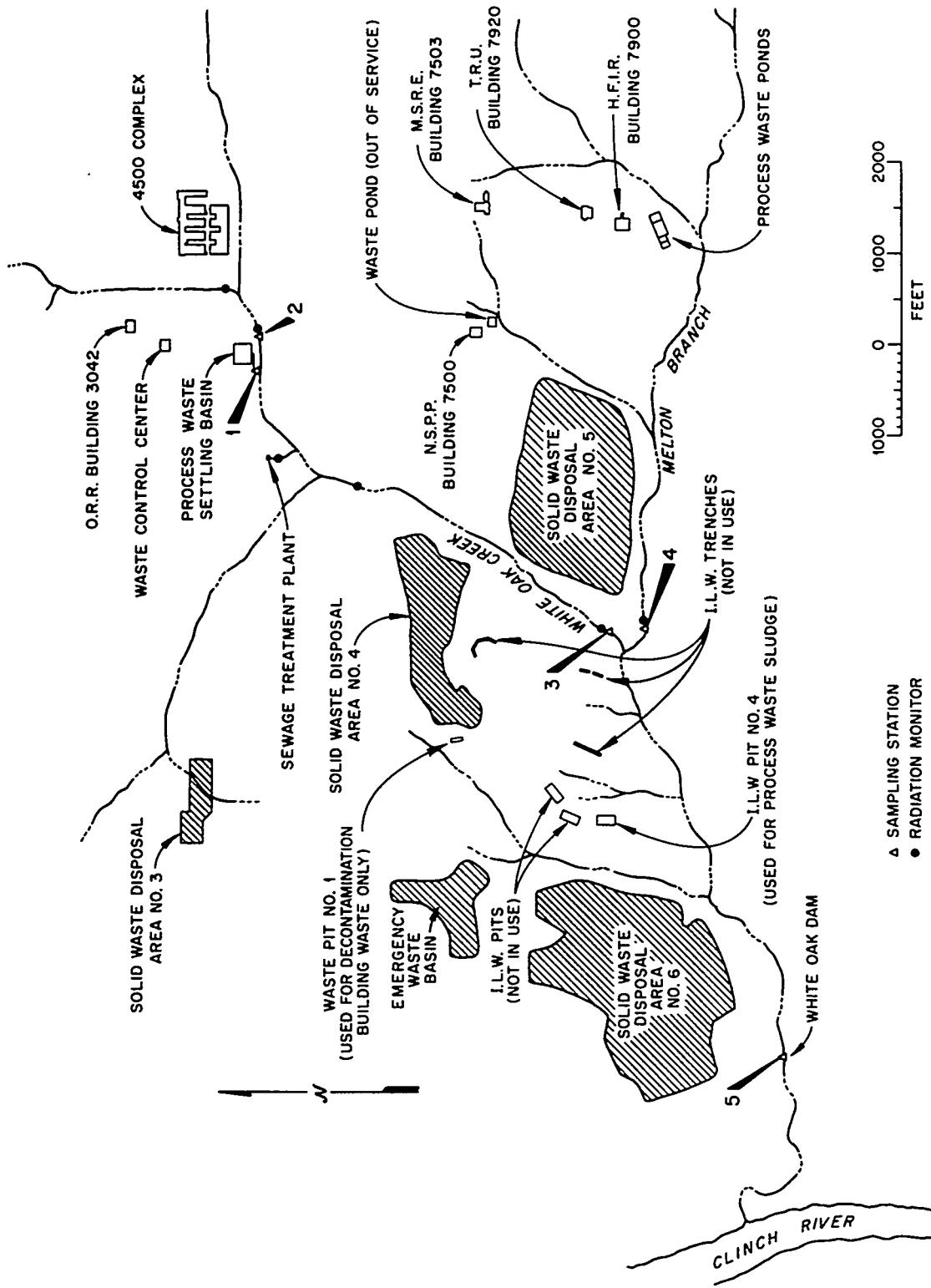


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.70	1.39
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.05	0.08
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.75	2.10
Total discharge from all sources	3,4	0.86	2.33
White Oak Dam to Clinch River (Health Physics measurement)	5	0.71	1.13

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml ^a	⁹⁰ Sr		Volume	
		Curies Total	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	252	0.03	4.5	0.12	2.3
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.14 ^b	21.2	0.38	7.3
3. Reactor Operations (MH112)	5.5	<0.01	-	0.31	5.9
4. Buildings 3503 and 3508	26.4	0.10	15.2	1.16	22.2
5. Buildings 3025 and 3026	5.3	<0.01	-	0.45	8.6
6. Building 3019	9.8	<0.01	-	0.13	2.5
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	57	0.06	9.1	0.53	10.1
9. Buildings 3525 and 3550	-	<0.01	-	0.77	14.7
10. Building 2026	0.1	<0.01	-	0.23	4.4
11. Tank Farm Drainage	99	0.33	50.0	1.14	21.8

^aCounted at 30% geometry.^bThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Filterable	
		Activity ^a (Curies)	Particulate Activity ^b (Microcuries)
HRLAL	2026	0.01	0
Central Radioactive Gas Disposal Facilities	3039	0.17	848
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.03	46
Total activity in gases released		0.21	896

^aActivity primarily ^{131}I as noted in text.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in
White Oak Creek and Melton Branch - January, 1973

Measurement (a)	Standard (b)	Sample Point (c)	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5 <1 pH unit/day change	3	9.40	5.35	50 ^d	32.75
Dissolved Oxygen	5 ppm Min.	4	8.95	6.70	2 ^e	1.4
Temp.	<30°C <2°C/hr change	3	>15	6.0	None	-
		4	12.3	8.05	None	-
		4	11.0	<5.0	None	-

- a. These measurements are continuous and are recorded.
- b. These are Tennessee Water Quality Criteria standards.
- c. Refer to Figure 7.
- d. Forty-five excursions outside the 6.5-8.5 standard and five instances where the pH changed more than one unit per day without going outside the limits. The Steam Plant was responsible for thirty-seven excursions and all five unit changes in pH; the ORR was responsible for six excursions; the 190 retention pond was responsible for one excursion and one was from an unknown source.
- e. Two excursions outside the 6.5-8.5 standard. The TRU retention pond and the HFIR retention pond were each responsible for an excursion.

Table 5A. Nonradioactive Effluents, December, 1972

Substance	Standard ^b	Sample Point ^c	Concentration for Week Ending ^a		
			12-10-72	12-17-72	12-25-72
Cr	0.05 ppm	3	0.08	0.03	0.05
		4	0.27	0.26	0.30
Cd	0.01 ppm	3	0.005	<0.01	<0.01
		4	0.003	<0.01	<0.01
Zn	0.5 ppm	3	0.022	0.01	0.03
		4	0.076	0.03	0.05
Pb	0.05 ppm	3	0.002	<0.02	<0.02
		4	0.003	<0.02	<0.02
PO ₄	P=1 ppm	3	0.60	0.26	0.42
		4	0.11	0.054	0.058
NO ₃	45 ppm	3	0.79	0.62	0.74
		4	0.18	0.65	0.08
As	0.05 ppm	3	≤0.01	≤0.02	≤0.02
		4	≤0.01	≤0.02	≤0.03
Hg	2 ppb	3	0.89	0.74	0.60
		4	<0.01	0.45	0.009
Phenols	0.2 ppm	3	—	—	—
		4	—	—	—

a. These weekly samples are continuous and proportional to the flow in the creek.

b. These are the standards currently being considered by the EPA.

c. Refer to Figure 7.

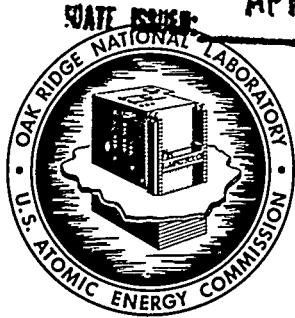
Table 5B. Nonradioactive Effluents, January, 1973

Substance	Standard ^b	Sample Point ^c	Concentration for Week Ending ^a			
			1-8-73	1-14-73	1-21-73	1-28-73
Cr	0.05 ppm	3	0.025	0.05	0.12	0.12
		4	0.24	0.30	0.51	0.37
Cd	0.01 ppm	3	<0.005	<0.005	<0.005	<0.005
		4	<0.005	<0.005	<0.005	<0.005
Zn	0.5 ppm	3	0.02	0.047	0.03	0.03
		4	0.08	0.12	0.11	0.047
Pb	0.05 ppm	3	<0.02	<0.02	<0.02	<0.02
		4	<0.02	<0.02	<0.02	<0.02
PO ₄	P=1 ppm	3	0.29	0.56	0.20	0.27
		4	0.13	0.058	0.01	0.05
NO ₃	45 ppm	3	0.29	0.50	0.28	0.36
		4	0.59	0.10	0.40	0.34
As	0.05 ppm	3	≤0.03	0.62 ppb	0.61 ppb	0.5 ppb
		4	≤0.02	0.75 ppb	0.95 ppb	≤0.5 ppb
Hg	2 ppb	3	0.57	0.36	6.27	1.79
		4	0.032	0.11	0.072	0.06
Phenols	0.2 ppm	3	<5 ppb	<0.3 ppb	<0.3 ppb	6 ppb
		4	<5 ppb	6 ppb	10 ppb	9 ppb

a. These weekly samples are continuous and proportional to the creek flow.

b. These are the standards currently being considered by the EPA.

c. Refers to Figure 7.



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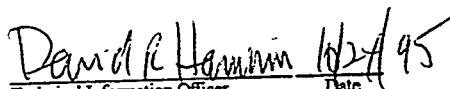
DATE: April 3, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

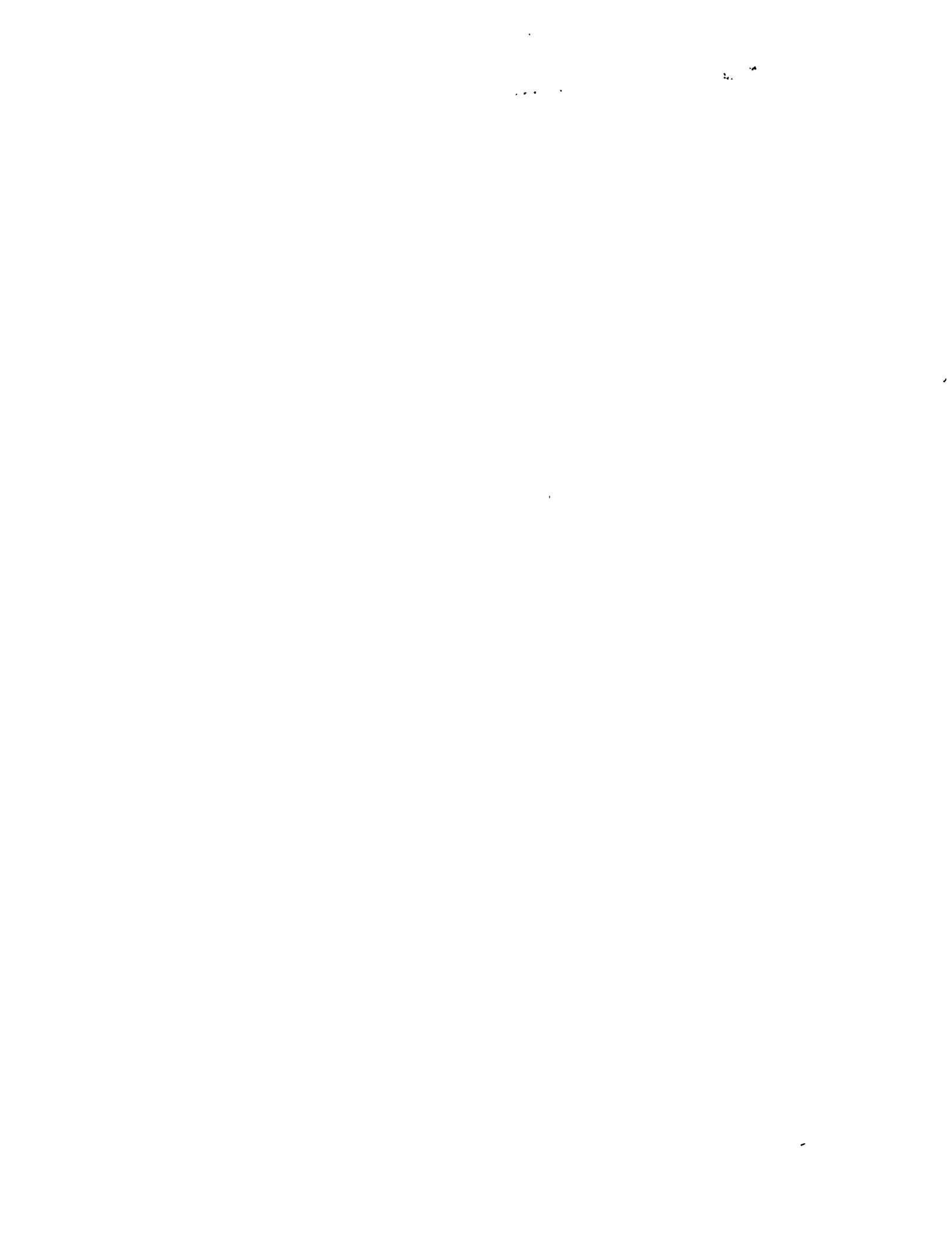
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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of February, 1973, was 1.08% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.88% MPC_W, 0.12% MPC_W, and 0.05% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The high ⁹⁰Sr discharge, noted in Table 1 and Figures 2 and 3, is apparently the result of an unexplained low efficiency encountered at the waste treatment plant and a higher-than-normal leaching-out of strontium from the burial grounds due to above-normal rainfall.

Process Waste

A total of 3.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ⁹⁰Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 312 gph.

	<u>Gallons</u>
Total volume generated	160,000
Volume transferred to evaporator	210,000
Tank Farm free space at beginning of month	470,000
Tank Farm free space at end of month	511,000
Evaporator concentrate returned to tank farm	9,000
Volume of concentrate available for hydrofracture (South Tank Farm)	32,000*

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	38,900
Fission Products Development Laboratory	10,500
ORR and BSR	24,300
High Flux Isotope Reactor	24,000
Radioisotopes Processing Area	10,700
4500 Complex	8,300
Transuranium Processing Area	6,500

* This figure does not include the 18,000 gals of waste that is stored in W-9 and is scheduled for reprocessing.

GASEOUS WASTE

The ORNL stacks discharged 470 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 582 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.2% and 0.6% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards forty times while the pH of Melton Branch was out of compliance only once. The only other instance of noncompliance was a temperature rise greater than $2^{\circ}\text{C}/\text{hr}$ in White Oak Creek. This was due to a sudden, cold rainstorm.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above. Chromates at all three locations continued out of compliance for the entire month. The mercury in White Oak Creek was also out of compliance for the entire month. An investigation is under way to locate the source of the mercury contamination in White Oak Creek. Measures for correcting the chromate and pH violations were noted in the January, 1973, report.

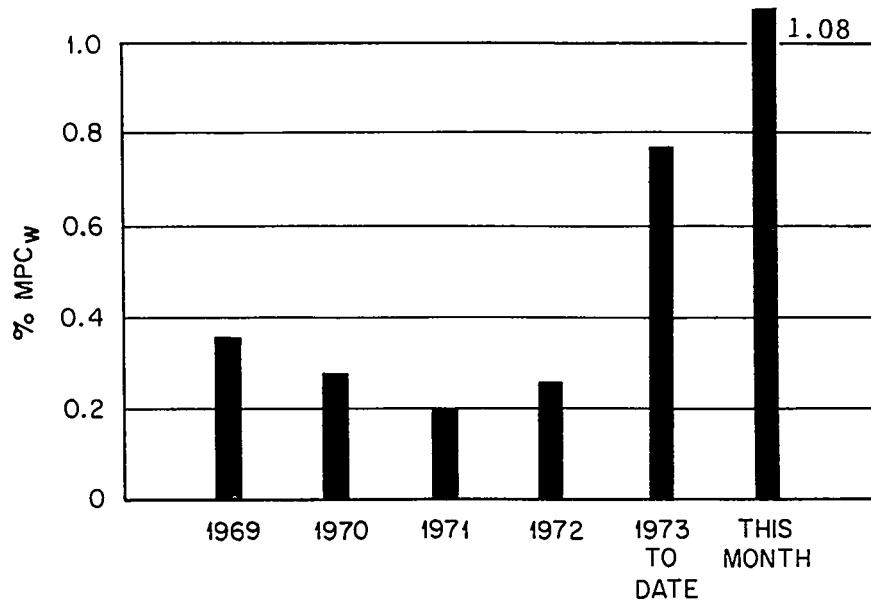


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

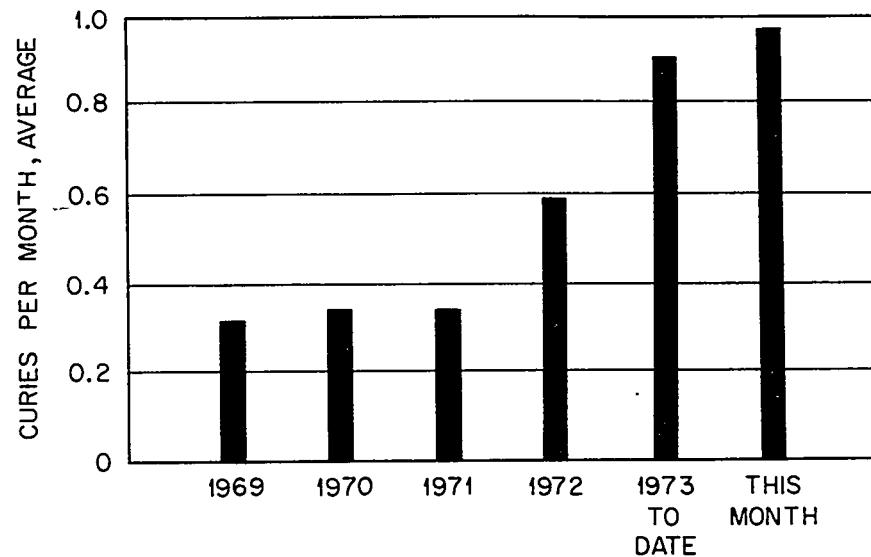


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

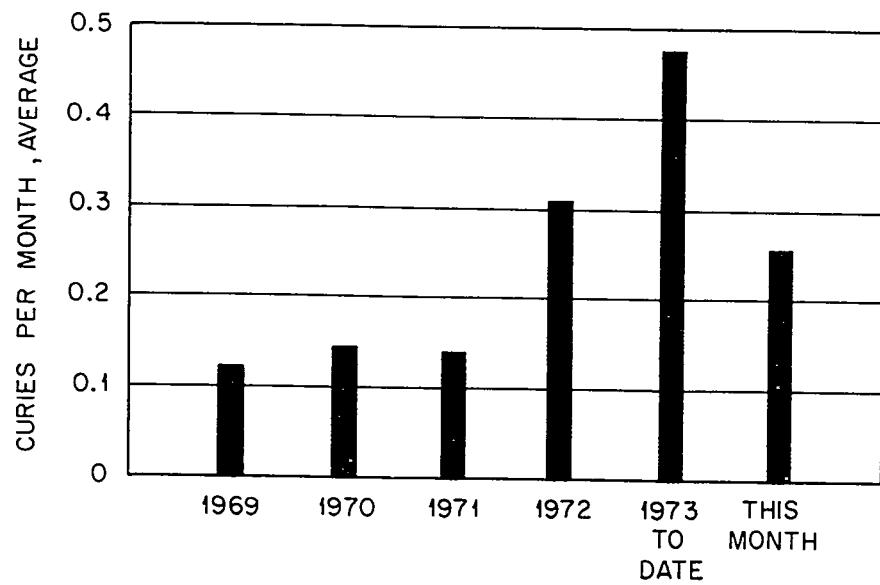


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

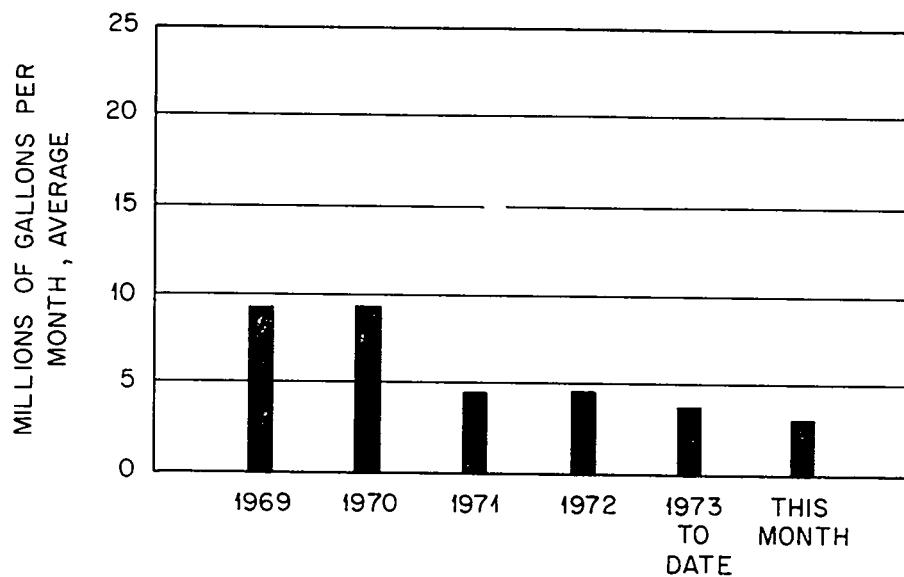


Fig 4. Process Waste Volumes.

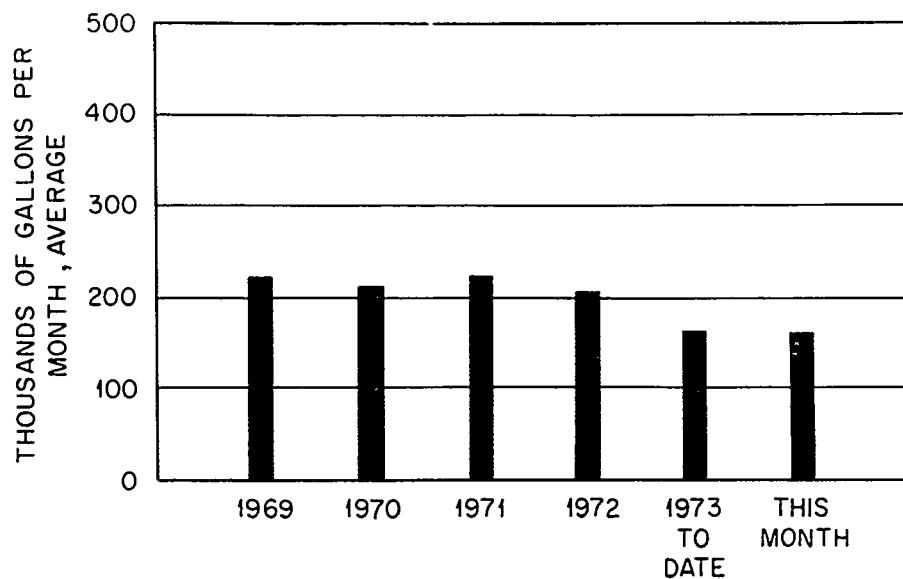


Fig 5. Intermediate - Level Waste Volumes.

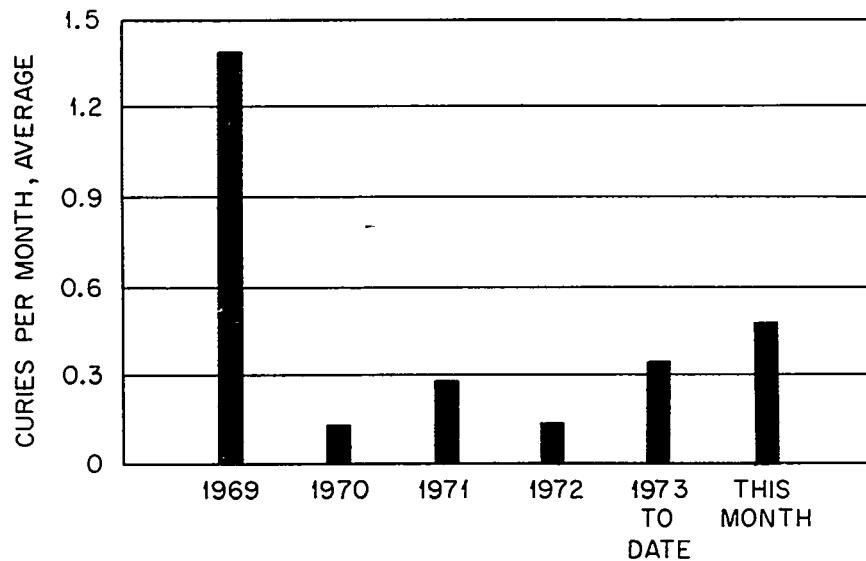


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

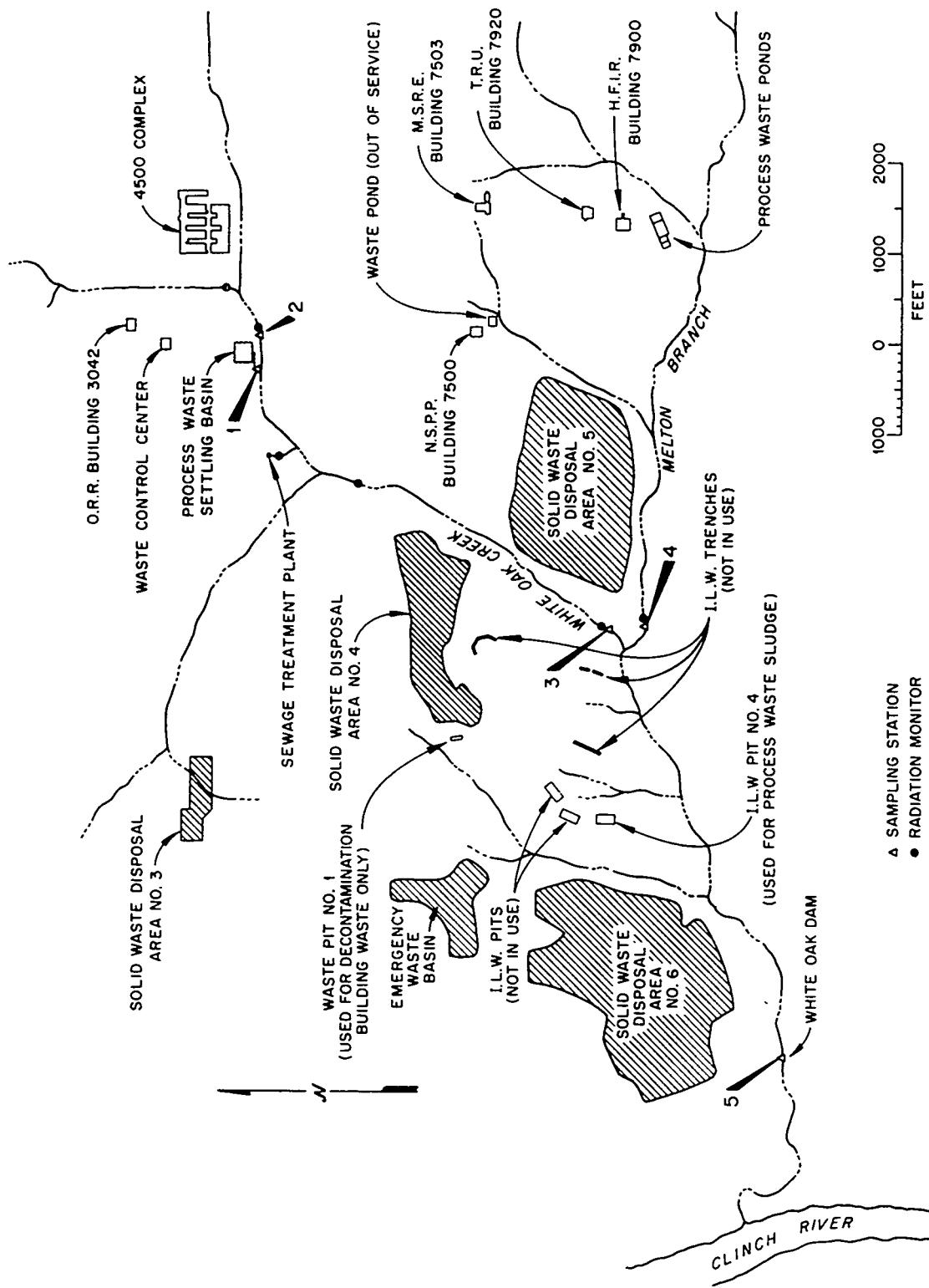


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.258	0.569
Miscellaneous discharges from east end of plant	2	0.063	0.103
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.609	1.552
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.364	0.573
Total discharge from all sources	3,4	0.973	2.125
White Oak Dam to Clinch River (Health Physics measurement)	5	0.88	1.3

^aRefers to Fig. 7.

^bThese are approximations based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml ^a	Gross-Beta Curies ^b	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	72.0	0.04	5.2	0.10	2.0
2. Radisotopes Processing Area (MH114 minus MH112)	39.0	0.14 ^c	18.2	0.45	8.8
3. Reactor Operations (MH112)	4.16	<0.01	-	0.19	3.7
4. Buildings 3503 and 3508	20.6	0.13	16.9	1.09	21.4
5. Buildings 3025 and 3026	4.0	<0.01	-	0.41	8.0
6. Building 3019	27.7	<0.01	-	0.05	1.0
7. Fission Products Development Laboratory	-	-	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	-	-	-	0.77	15.1
9. Buildings 3525 and 3550	0.05	<0.01	-	0.79	15.5
10. Building 2026	0.06	<0.01	-	0.19	3.7
11. Tank Farm Drainage	78.0	0.46	59.7	1.05	20.6

^aCounted at 30% geometry.^bThese are approximations based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.05	455
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.42 ^c	126
Total activity in gases released		0.47	582

^aActivity primarily ^{131}I as noted in text.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

^cThis activity was released from the Transuranium Processing Plant.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam February, 1973

Measurement (a)	Standard (b)	Sample Point (c)	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5 <1 pH unit/day change	3 4 5	>9.5 8.6 7.6	<4.5 6.9 6.8	40d 1e None	29.7 0.5 -
Dissolved Oxygen	5 ppm Min.	3 4 5	>15 13.5 13.9	8.8 8.6 8.2	None None None	- - -
Temp.	<30°C < 2°C/hr change	3 4 5	15.9 15.0 13.5	7.0 <5.0 <5.0	1f None None	- - -

- a. These measurements are continuous and are recorded.
- b. These are Tennessee Water Quality Criteria standards.
- c. Refer to Figure 7.
- d. Forty excursions outside the 6.5-8.5 standard. The Stream Plant was responsible for thirty excursions, the ORR was responsible for eight excursions, and the 190 retention pond was responsible for two excursions.
- e. One excursion outside the 6.5-8.5 standard. The HFIR retention pond was responsible.
- f. One temperature change greater than 2°C per hour due to a sudden, cold rainstorm.

Table 5. Nonradioactive Effluents, February, 1973

Substance	Standard ^b	Sample Point ^c	Concentration for Week Ending ^a			
			2-4-73	2-11-73	2-18-73	2-25-73
Cr	0.05 ppm	3 4 5	0.094 0.45 -	0.07 0.53 0.093	0.047 0.41 0.078	0.126 0.95 0.212
Cd	0.01 ppm	3 4 5	<0.005 <0.005 -	<0.005 <0.005 <0.005	<0.005 <0.005 <0.005	<0.005 <0.005 <0.005
Zn	0.5 ppm	3 4 5	0.055 0.055 -	0.023 0.095 <0.005	0.041 0.036 0.016	0.050 0.049 0.012
Pb	0.05 ppm	3 4 5	<0.02 <0.02 -	<0.02 <0.02 <0.02	<0.02 <0.02 <0.02	<0.02 <0.02 <0.02
PO ₄	P=1 ppm	3 4 5	0.32 0.04 -	0.20 0.071 0.13	0.024 0.018 0.116	0.178 0.083 0.178
NO ₃	45 ppm	3 4 5	0.15 0.09 -	0.039 16.5 0.31	0.060 5.4 1.1	1.30 1.0 1.1
As	0.05 ppm	3 4 5	0.5 ppb 0.6 ppb -	< 0.2 ppb < 2 ppb - 2 ppb	< 2 ppb < 2 ppb - 2 ppb	1.0 ppb < 1.0 ppb < 1.0 ppb

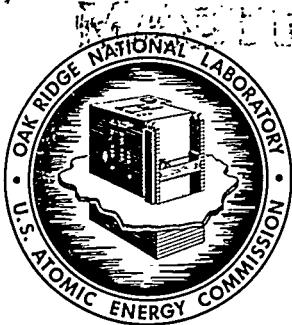
- a. These weekly samples are continuous and proportional to the creek flow.
- b. These are the standards currently being considered by the EPA.
- c. Refer to Figure 7.

Table 5. Nonradioactive Effluents, February, 1973 (Continued)

Substance	Standard ^b	Sample Point ^c	Concentration for Week Ending ^a			
			2-4-73	2-11-73	2-18-73	2-25-73
Hg	2 ppb	3	3.3	4.29	2.07	4.11
		4	0.038	0.026	2.27	0.03
		5	-	2.73	0.004	7.50
Phenols	0.2 ppm	3	1.6 ppb	1.3 ppb	1.3 ppb	2.8 ppb
		4	3.1 ppb	2.5 ppb	3.4 ppb	<1.0 ppb
		5	-	<1.0 ppb	<1.0 ppb	<1.0 ppb

- a. These weekly samples are continuous and proportional to the creek flow.
- b. These are the standards currently being considered by the EPA.
- c. Refer to Figure 7.

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ORNL

CENTRAL FILES NUMBER

73-8-13

DATE: August 9, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamrin 10/24/75

 Technical Information Officer Date
 ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of May, 1973, was 0.47% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.31% MPC_W, 0.14% MPC_W, and 0.008% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.2 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 263 gph.

	<u>Gallons</u>
Total volume generated	209,000
Volume transferred to evaporator	196,000
Tank Farm free space at beginning of month	503,000
Tank Farm free space at end of month	484,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	72,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	35,900
Fission Products Development Laboratory	16,900
ORR and BSR	40,800
High Flux Isotope Reactor	18,300
Radioisotopes Processing Area	22,300
4500 Complex	26,200
Transuranium Processing Area	2,200

GASEOUS WASTE

The ORNL stacks discharged 170 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 215 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-six times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

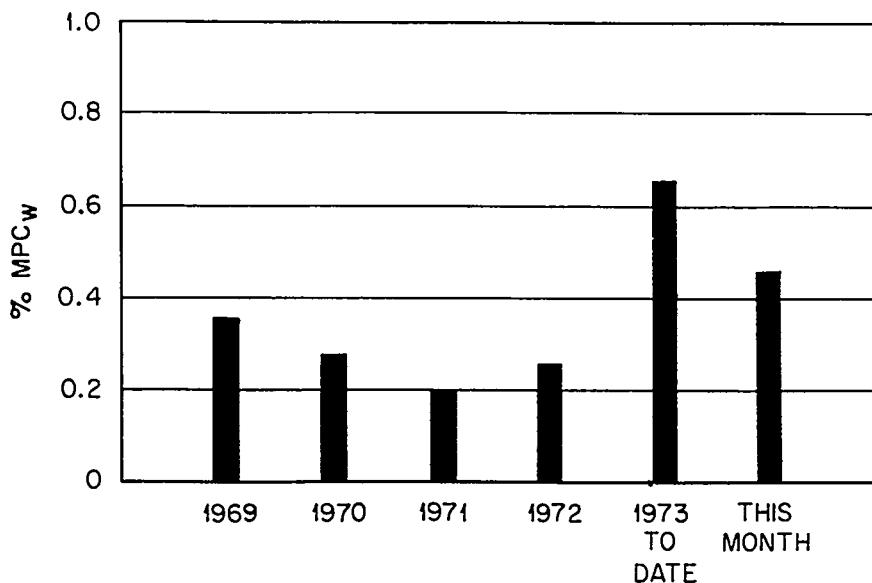


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

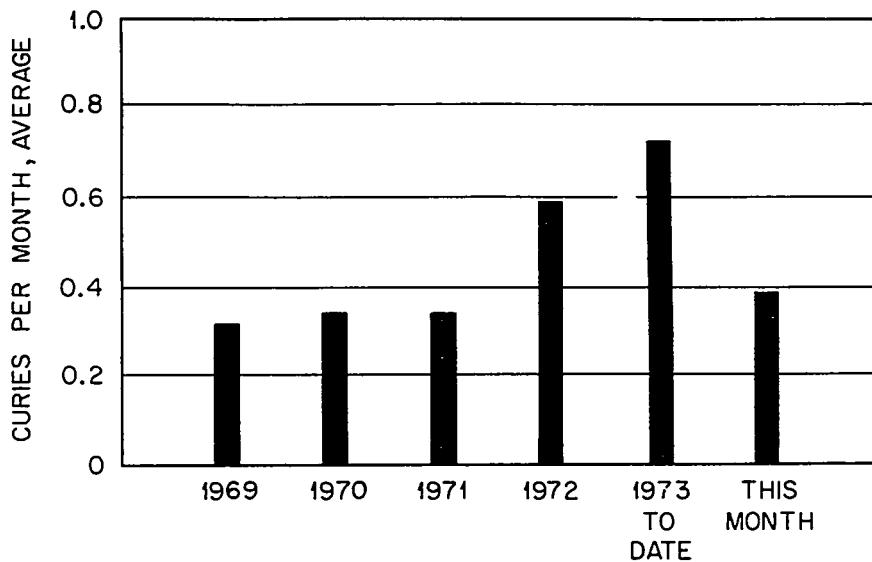


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

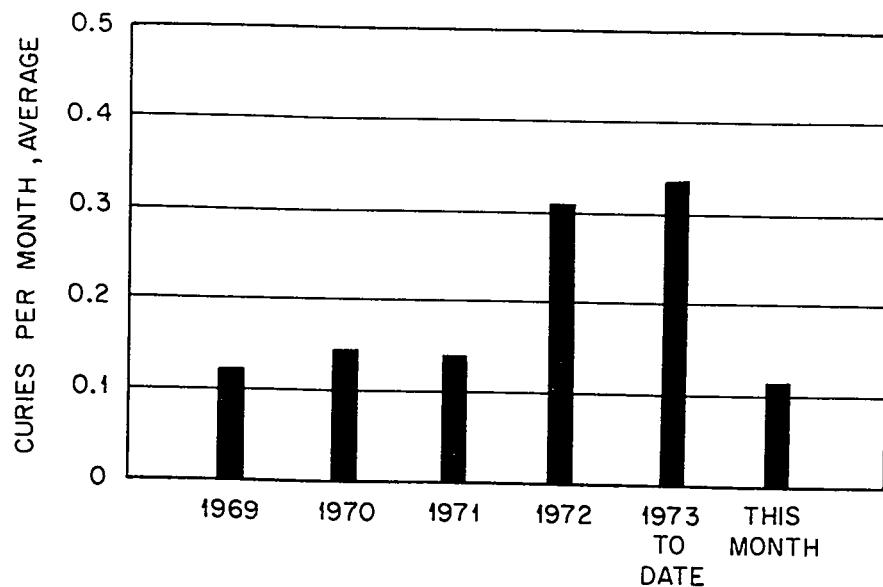


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

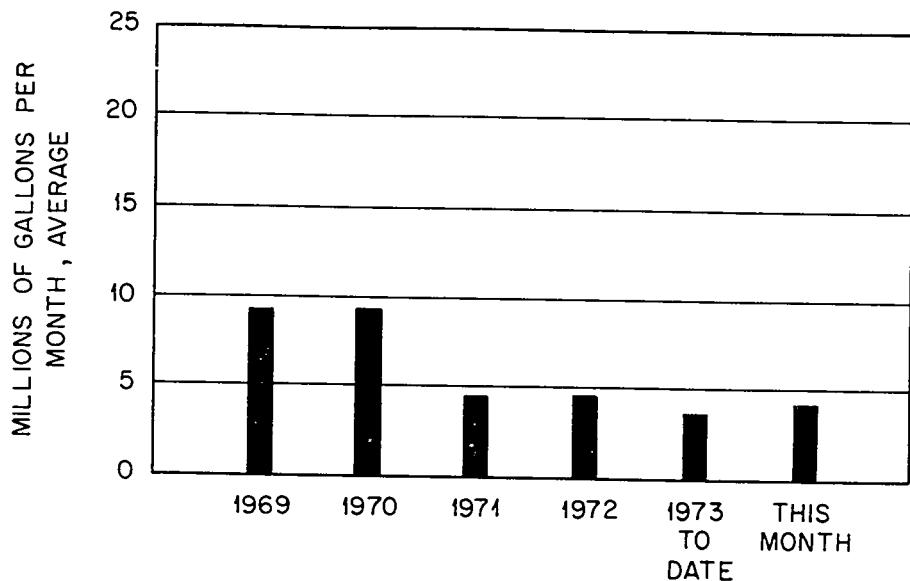


Fig 4. Process Waste Volumes.

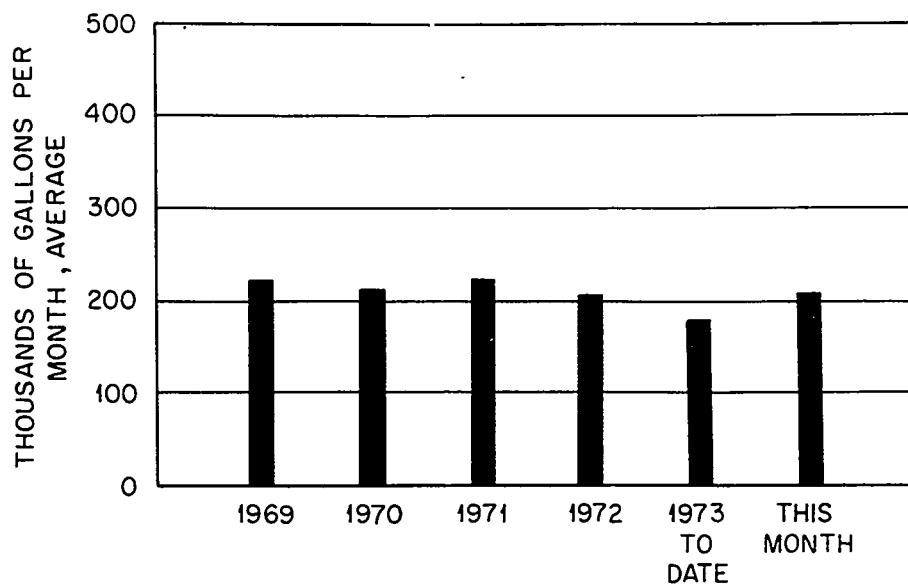


Fig 5. Intermediate - Level Waste Volumes.

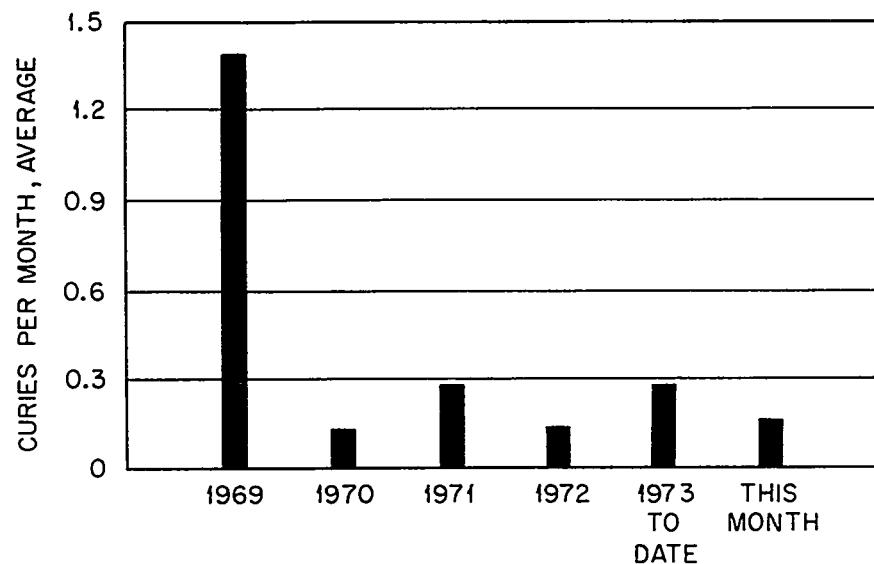


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

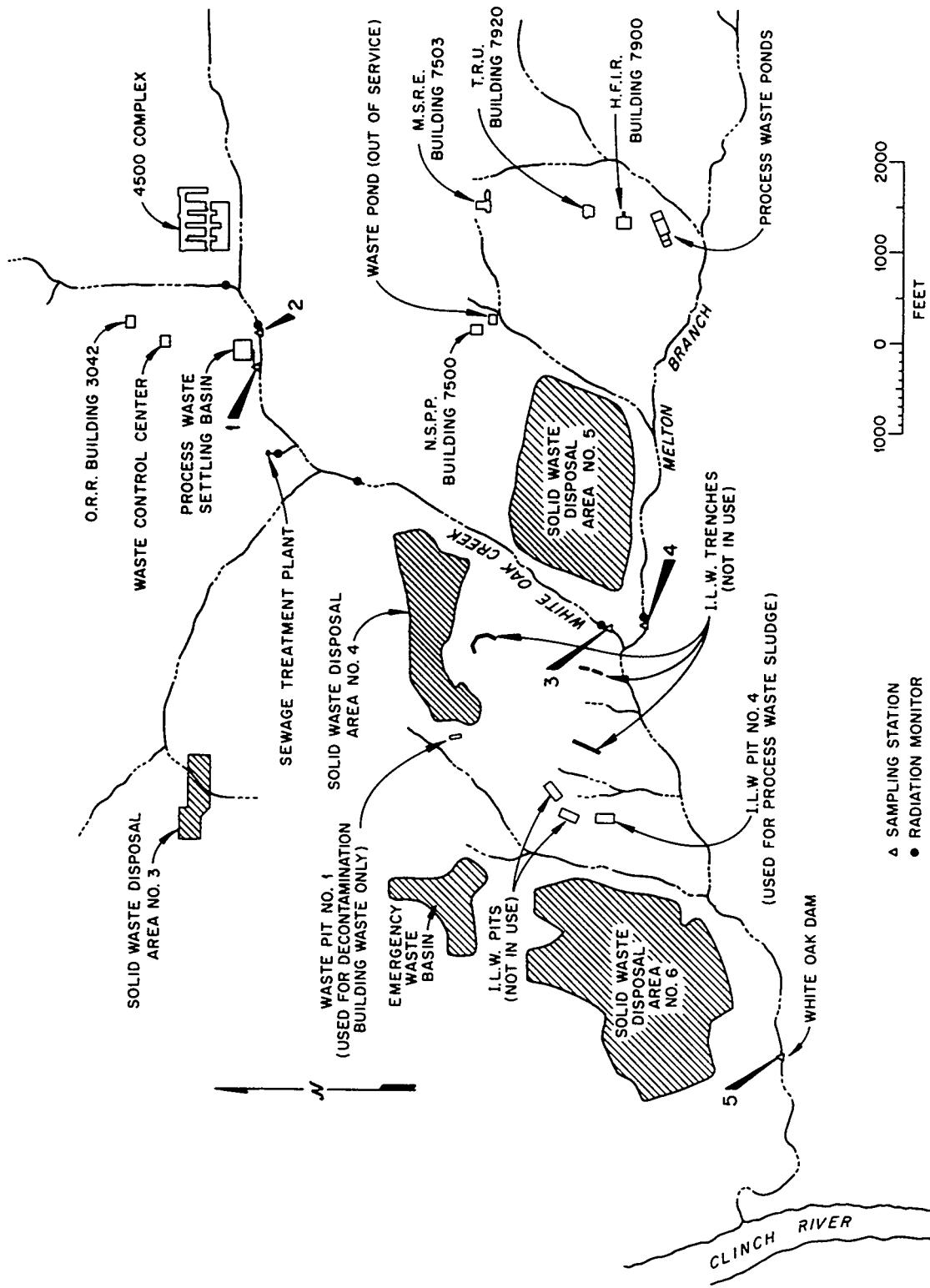


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.12	0.25
Miscellaneous discharges from each end of plant	2	0.01	≤ 0.11
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.30	0.76
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.09	0.16
Total discharge from all sources	3,4	0.39	0.92
White Oak Dam to Clinch River (Health Physics measurement)	5	0.77	1.20

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m ³ ml ^a	Gross-Beta Curies ^b Total	% of Total	Volume Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	139	0.09	5.0	0.12	2.3
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.50 ^c	26.7	0.39	7.4
3. Reactor Operations (MH112)	5.1	0.01	0.5	0.50	9.4
4. Buildings 3503 and 3508	23	0.14	7.5	1.05	19.8
5. Buildings 3025 and 3026	3.5	0.01	0.5	0.73	13.8
6. Building 3019	6.1	<0.01	-	0.09	1.7 ¹²
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	196	0.61	32.6	0.55	10.4
9. Buildings 3525 and 3550	< 0.05	<0.01	-	0.62	11.7
10. Building 2026	< 0.01	<0.01	-	0.11	2.1
11. Tank Farm Drainage	80.1	0.51	27.2	1.12	21.2

^a Counted at 30% geometry.^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.16	174
Radiochemical-Processing Pilot Plant	3020	0	6
MSRE	7512	0	0
HFIR	7911	0.01	35
Total activity in gases released		0.17	215

^aActivity primarily ^{131}I as noted in text.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam May, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance, Hrs	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH <1 pH unit/day change	6.5-8.5	3	9.2	< 4.5	36 ^d	27.4
		4	8.2	6.6	None	-
		5	8.6	6.5	None	-
Dissolved Oxygen 5 ppm Min.		3	9.8	5.2	None	-
		4	9.6	6.6	None	-
		5	>15.0	5.1	None	-
Temp. < 2°C/hr change	<30°C	3	23.7	14.0	None	-
		4	23.7	14.0	None	-
		5	25.0	16.4	None	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dThirty-six excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for twenty-eight excursions, the ORR was responsible for eight excursions.

Table 5. Concentration of Nonradioactive Effluents
May, 1973

<u>Contaminant</u>	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.065	0.935	0.145	0.010
Zn	0.5	0.008	0.030	<0.005	<0.005
Pb	0.05	0.004	<0.002	0.005	0.002
P	1	0.08	0.02	0.04	0.01
NO ₃	45	2.30	1.10	1.50	0.06
Hg	0.002	0.0021	0.0002	0.0004	0.0000
Phenols	0.2	<0.001	<0.001	<0.001	<0.001

^aThese are the standards currently being considered by the EPA.

^bRefer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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CENTRAL FILES NUMBER

73-8-36

DATE: August 28, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1973.

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Daniel R. Hamlin 10/24/95

Technical Information Officer _____ Date _____
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1973, was 0.33% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.29% MPC_W, 0.035% MPC_W, and 0.004% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.4 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 200 gph.

	<u>Gallons</u>
Total volume generated	136,000
Volume transferred to evaporator	149,000
Tank Farm free space at beginning of month	484,000
Tank Farm free space at end of month	493,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture (South Tank Farm)	76,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	20,000
Fission Products Development Laboratory	10,700
ORR and BSR	28,400
High Flux Isotope Reactor	14,700
Radioisotopes Processing Area	19,900
4500 Complex	12,800
Transuranium Processing Area	3,700

GASEOUS WASTE

The ORNL stacks discharged 130 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 268 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards 25 times. The Steam Plant was responsible for 16 of the pH excursions and the ORR was the cause of 9. A request has been submitted for \$48,400 for a pH control pond for the Steam Plant effluent. The pH of Melton Branch was out of compliance only once and this occurred while the TRU retention pond was being emptied.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river. As can be noted, chromium continues to exceed the standard in both White Oak Creek and Melton Branch. It is expected that the HFIR blowdown water softener will be in operation by the end of the year. While this softener is still experimental, it is expected that it will eliminate the excess chromium in Melton Branch if it functions as anticipated.

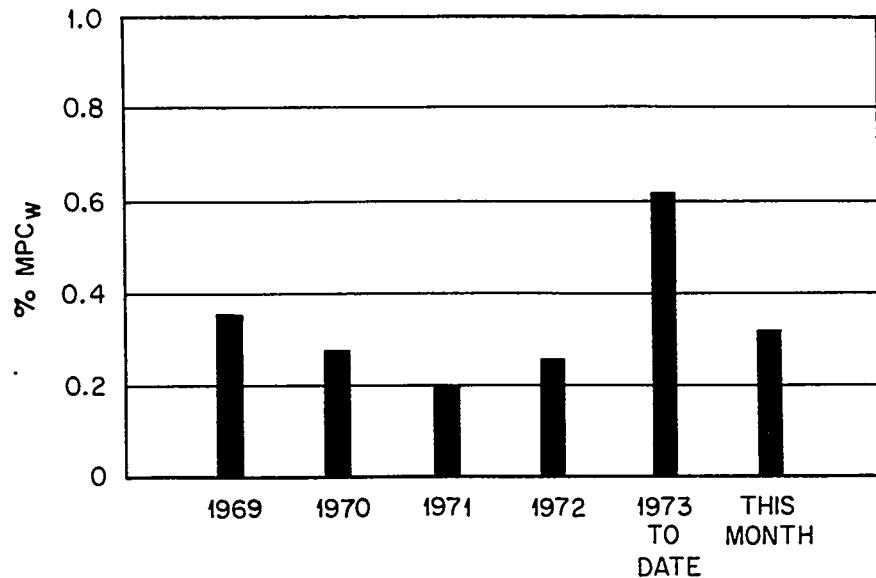


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

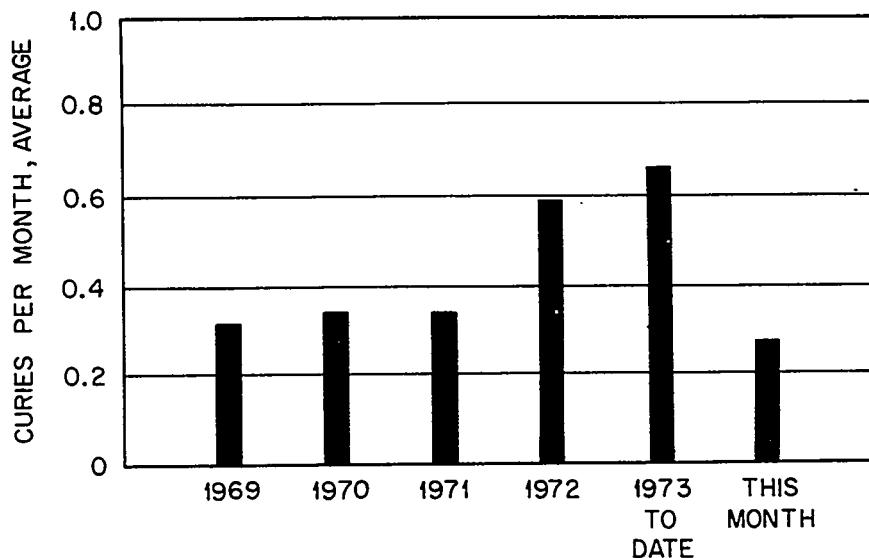


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7.).

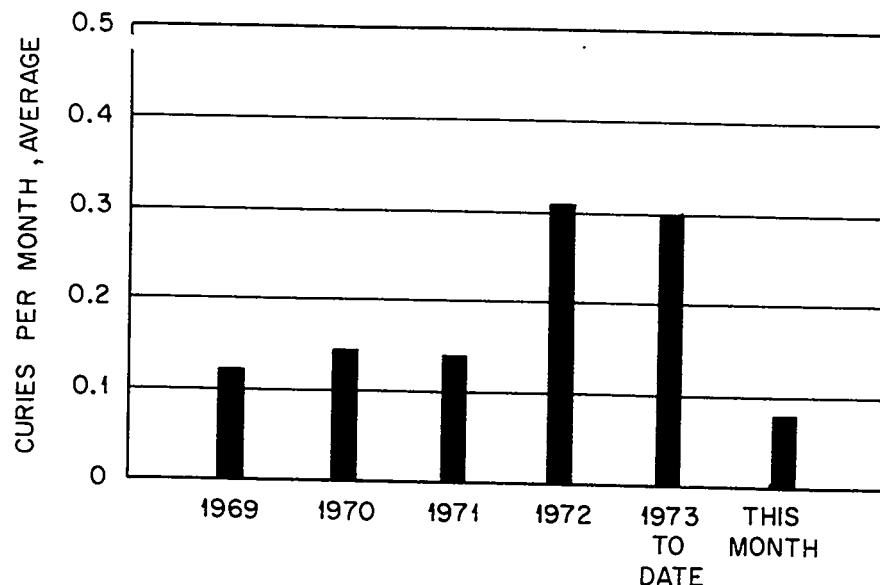


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

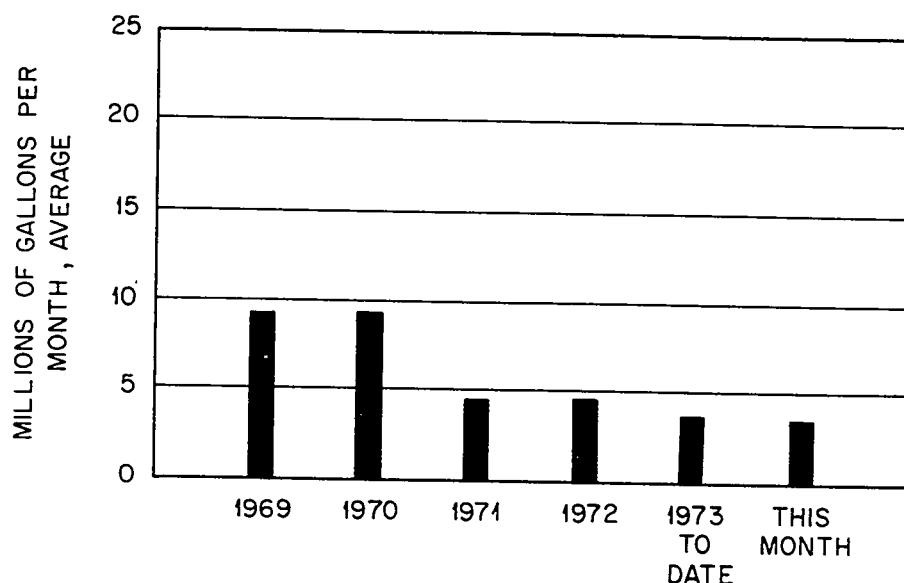


Fig 4. Process Waste Volumes.

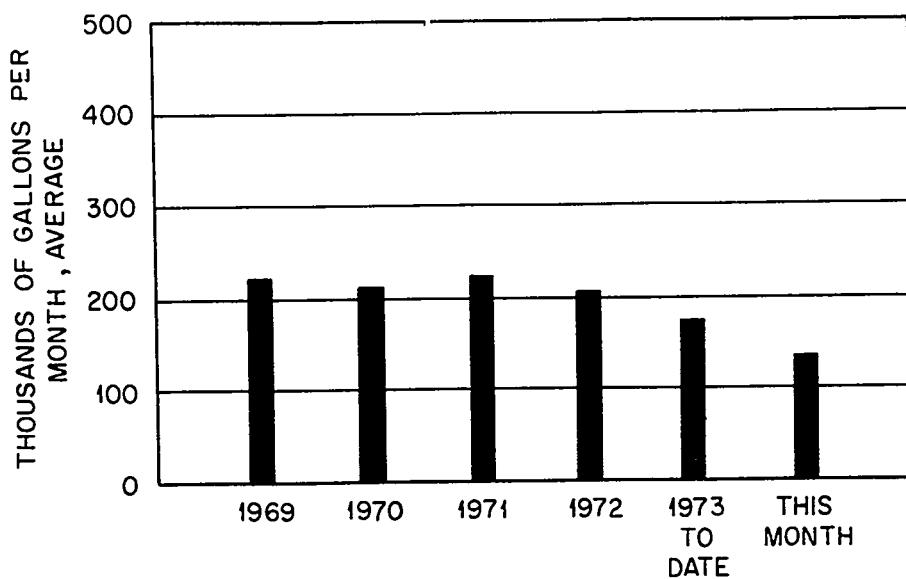


Fig 5. Intermediate - Level Waste Volumes.

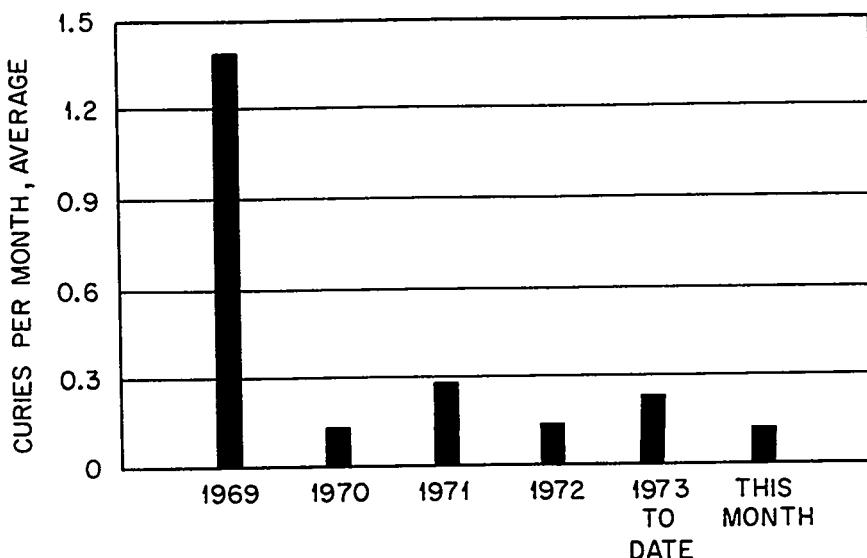


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

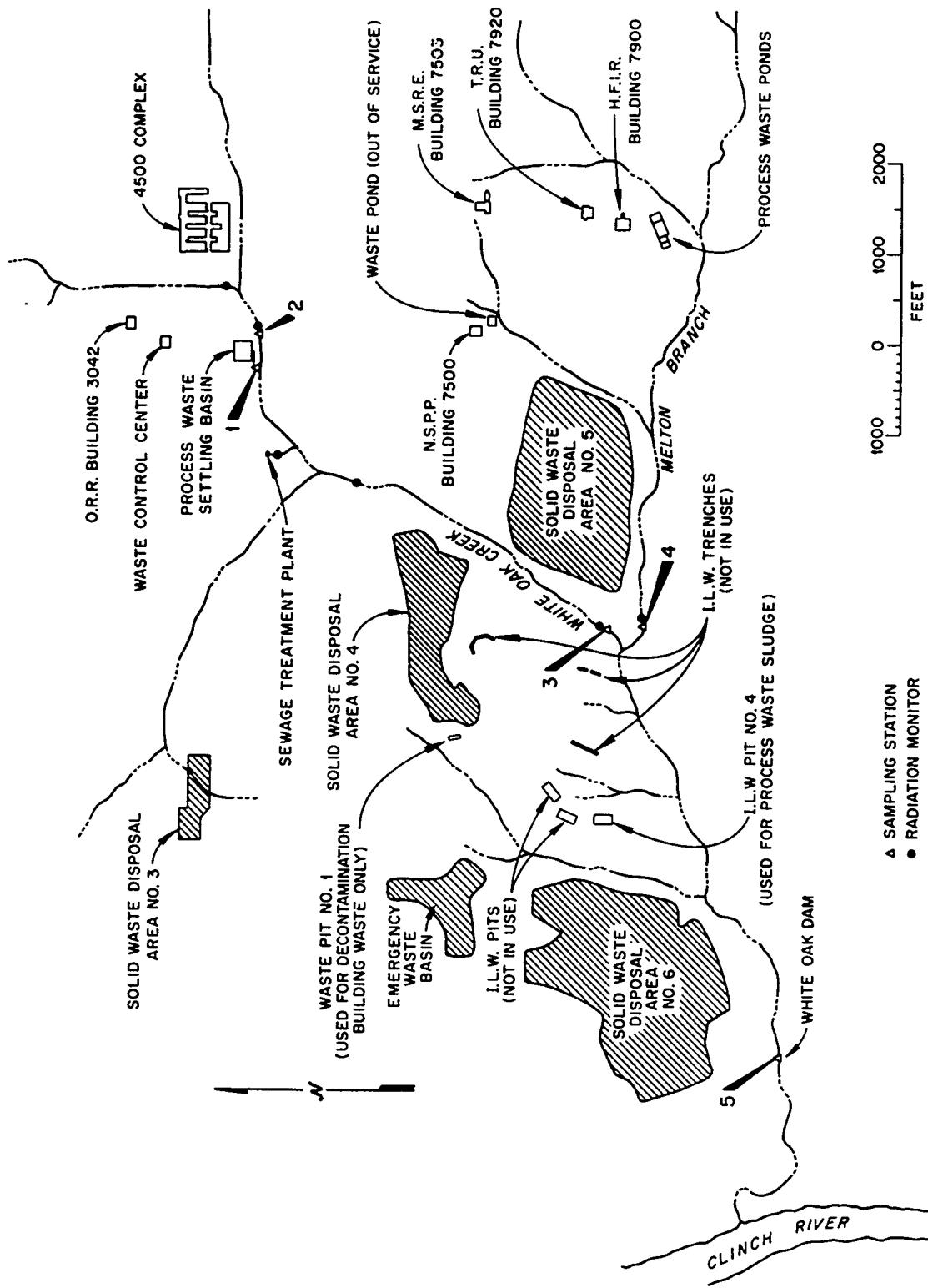


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Numbera	Total Sr, Curies	Gross Beta, Curiesb
Process Waste	1	0.08	0.18
Miscellaneous discharges from east end of plant	2	0.02	0.17
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.22	0.42
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.06	0.11
Total discharge from all sources	3,4	0.28	0.53
White Oak Dam to Clinch River (Health Physics measurement)	5	0.47	0.67

a Refers to Fig. 7.

b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/m ^a	Gross-Beta		Volume	
		Curies ^b	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	123	0.08	10.5	0.12	2.9
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.18 ^c	23.7	0.36	8.7
3. Reactor Operations (MH112)	8.5	0.01	1.3	0.30	7.3
4. Buildings 3503 and 3508	20.7	0.11	14.5	0.91	22.0
5. Buildings 3025 and 3026	2.8	<0.01	-	0.46	11.1
6. Building 3019	6.4	<0.01	-	0.04	1.0
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	69.5	0.05	6.6	0.43	10.4
9. Buildings 3525 and 3550	0.3	<0.01	-	0.42	10.2
10. Building 2026 (Sampler temporarily out of service)				0.13	3.2
11. Tank Farm Drainage	62	0.33	43.4	0.95	23.0

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a	Filterable
		(Curies)	Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.12	210
Radiochemical-Processing Pilot Plant	3020	0	6
MSRE	7512	0	0
HFIR	7911	0.01	52
Total activity in gases released		0.13	268

^aActivity primarily ^{131}I as noted in text.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam June, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5	3	9.1	<4.5	25 ^d	24
	<1 pH unit/day change	4	8.9	6.8	1 ^e	1.2
		5	8.2	6.5	None	-
Dissolved Oxygen	5 ppm Min.	3	10.2	4.1	6	8
		4	9.0	5.2	None	-
		5	>15.0	5.0	None	-
Temp.	<30°C	3	26.7	18.0	None	-
	< 2°C/hr change	4	28.5	19.3	None	-
		5	>30.0	20.3	f	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dTwenty-five excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for sixteen excursions, and the ORR was responsible for nine excursions.

^eOne excursion outside the 6.5-8.5 standard due to dumping the TRU retention pond.

^fThe temperature in White Oak Lake exceeded the 30°C limit seven times because of weather conditions.

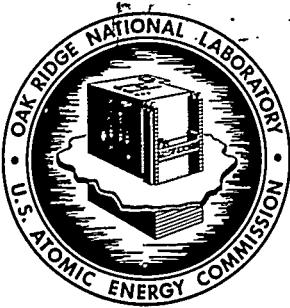
Table 5. Concentration of Nonradioactive Effluents
June, 1973

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.067	1.56	0.063	<0.005
Zn	0.1	0.044	0.029	0.023	0.024
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.13	0.07	0.054	0.005
NO ₃ (as N)	10	0.36	0.52	0.43	2.26
Hg	0.005	0.0007	0.0001	0.0002	0.0002
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

^aThese standards are the Tennessee Department of Public Health guidelines.

^bRefer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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CENTRAL FILES NUMBER

73-9-2

DATE: September 4, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hanum 10/5/95
Technical Information Officer
Date
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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of July, 1973, was 0.18% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.145% MPC_W, 0.035% MPC_W, and 0.002% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 195 gph.

	<u>Gallons</u>
Total volume generated	157,000
Volume transferred to evaporator	145,000
Tank Farm free space at beginning of month	493,000
Tank Farm free space at end of month	478,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture (South Tank Farm)	78,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	23,900
Fission Products Development Laboratory	18,000
ORR and BSR	29,000
High Flux Isotope Reactor	13,900
Radioisotopes Processing Area	18,800
4500 Complex	21,100
Transuranium Processing Area	4,300

GASEOUS WASTE

The ORNL stacks discharged 80 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 225 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.9% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards twenty-one times. The dissolved oxygen in White Oak Creek was below the minimum requirement sixteen times. A secondary sewage treatment plant has been approved and design is now underway. When this facility is placed in operation, the dissolved oxygen in White Oak Creek should remain above the minimum requirement.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

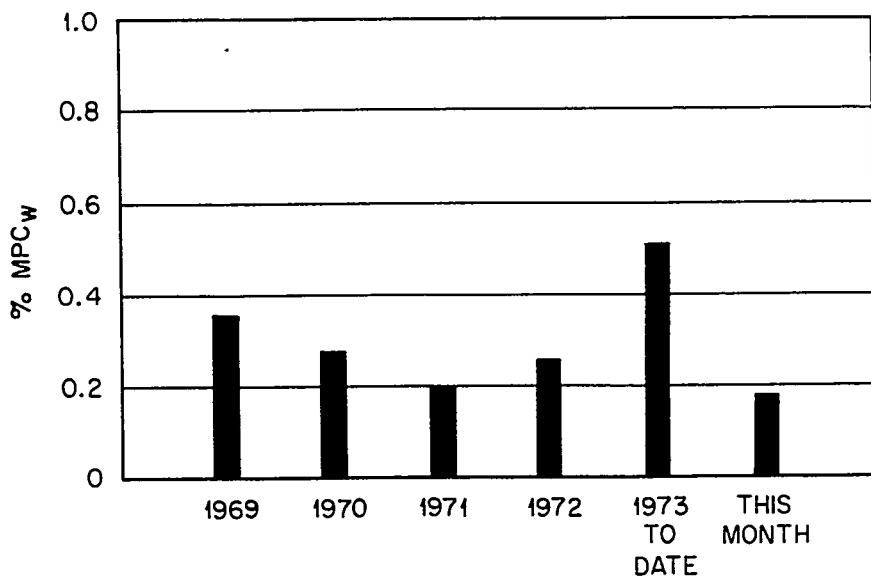


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

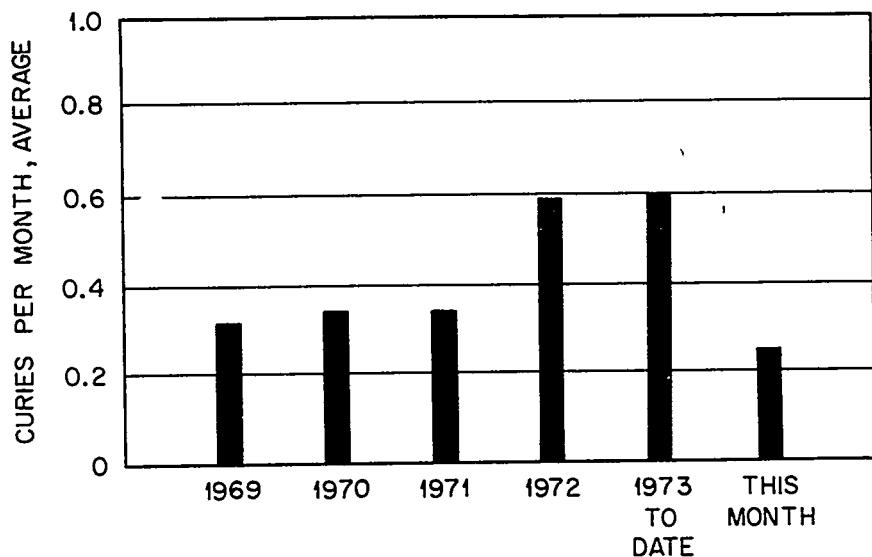


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

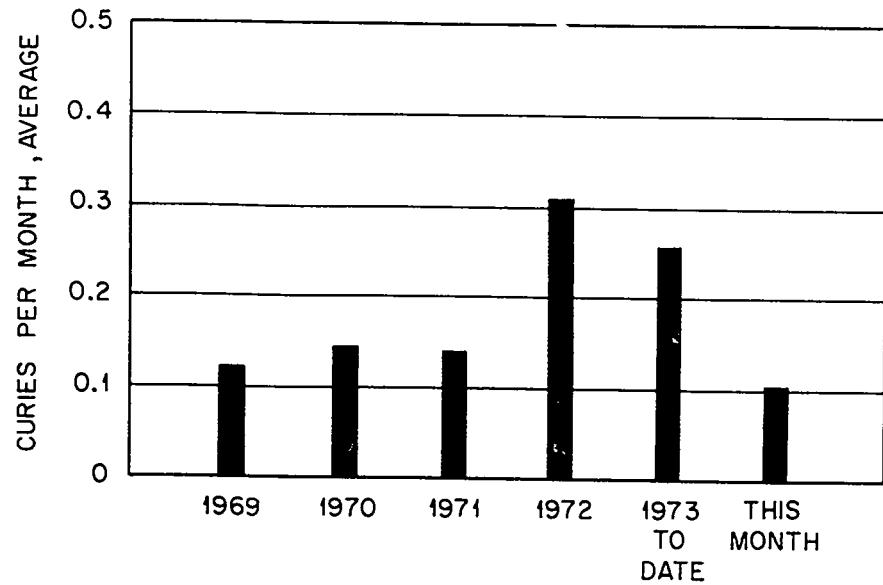


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

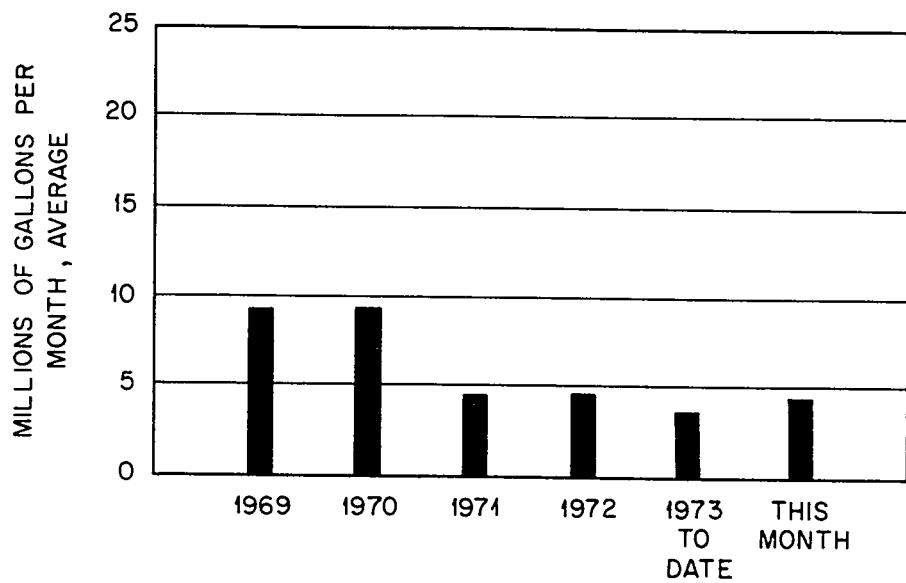


Fig 4. Process Waste Volumes.

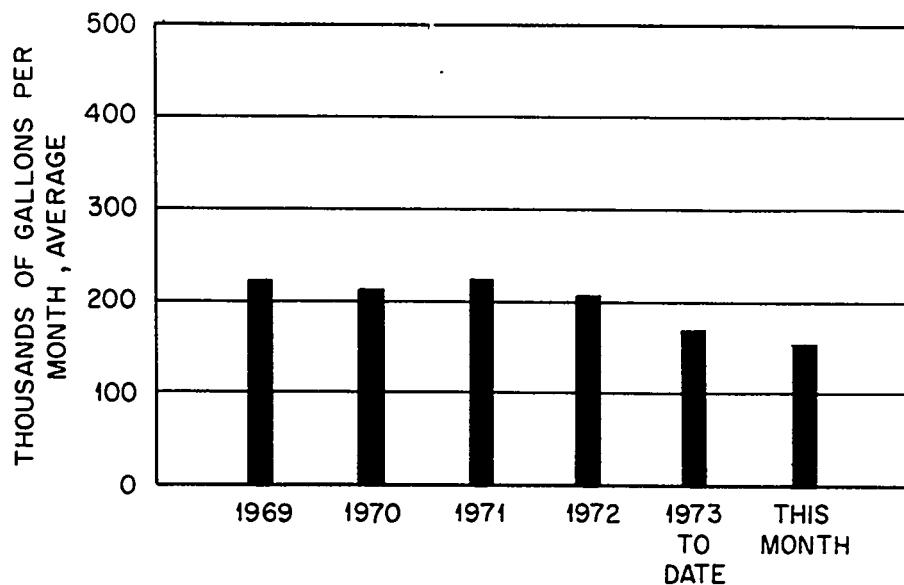


Fig 5. Intermediate - Level Waste Volumes.

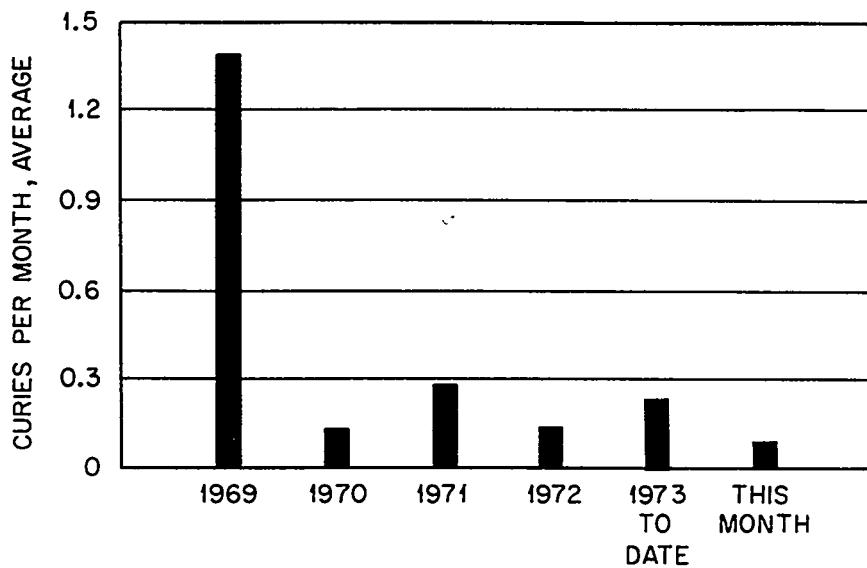


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

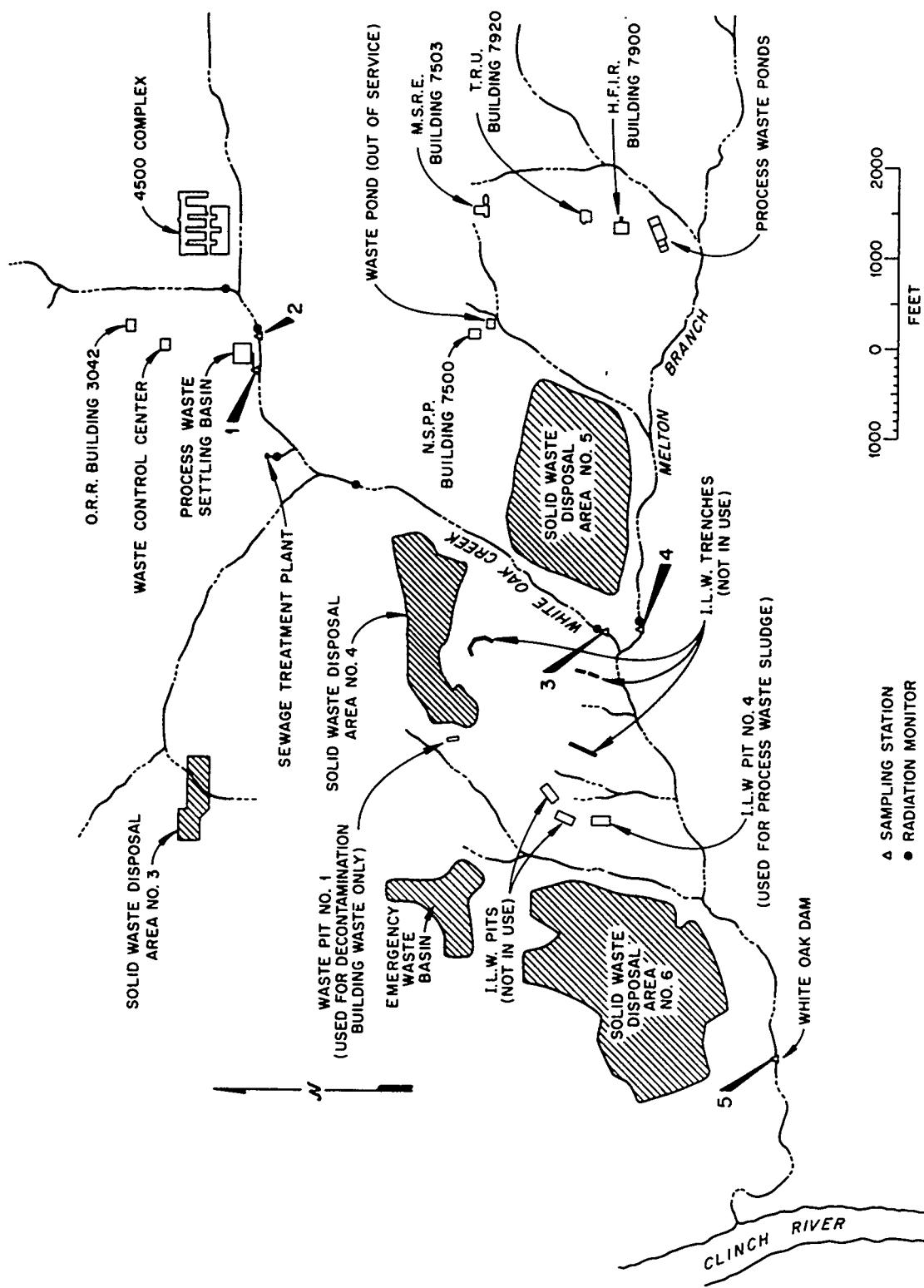


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.11	0.19
Miscellaneous discharges from east end of plant	2	0.03	\leq 0.13
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.18	0.41
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.07	0.13
Total discharge from all sources	3,4	0.25	0.54
White Oak Dam to Clinch River (Health Physics measurement)	5	0.14	0.24

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity c/m ³ ^a	Average	Gross-Beta		% of Total	Volume Million Gallons	% of Total
			Curies ^b	% of Total			
1. Radioisotopes Processing Area (MH234)		41.1	0.03	2.9	0.12	2.8	
2. Radioisotopes Processing Area (MH114 minus MH112)		-	0.05 ^c	4.9	0.23	5.3	
3. Reactor Operations (MH112)		12.9	0.04	3.9	0.55	12.7	
4. Buildings 3503 and 3508		75.0	0.39	38.3	0.91	20.9	
5. Buildings 3025 and 3026		2.6	<0.01	-	0.44	10.1	
6. Building 3019		13.9	<0.01	-	0.03	0.7	
7. Fission Products Development Laboratory		-	<0.01	-	0.01	0.2	
8. Waste Evaporator, Bldg. 2531		110.0	0.29	28.4	0.47	10.8	
9. Buildings 3525 and 3550		< 0.1	<0.01	-	0.48	11.0	
10. Building 2026		0.2	<0.01	-	0.18	4.1	
11. Tank Farm Drainage		42.6	0.22	21.6	0.93	21.4	

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)		Filterable Particulate Activity ^b (Microcuries)
		0	0	0
HRLAL	2026	0	0	0
Central Radioactive Gas Disposal Facilities	3039	0.075	172	
Radiochemical-Processing Pilot Plant	3020	0	1	
MSRE	7512	0	0	
HFIR	7911	0.005	52	
Total Activity in Gases Released at X-10 Site		0.080	225	
Isotopes Division - Y-12 Area		-	0.4	

^aActivity primarily ^{131}I as noted in text.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam July, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5	3	8.7	5.6	21 ^d	21.8
	<1 pH unit/day change	4	7.6	6.7		
		5	8.1	6.6		
Dissolved Oxygen	5 ppm Min.	3	9.7	0.2	16	106
		4	9.5	5.1		
		5	>15.0	4.0		
Temp.	<30°C	3	28.4	21.5	None	-
	< 2°C/hr change	4	>30.0	22.0		
		5	>30.0	24		

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- a. These measurements are continuous and are recorded.
- b. These are Tennessee Water Quality Criteria standards.
- c. Refer to Figure 7.
- d. Twenty-one excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for eighteen excursions, and the ORR was responsible for three excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.
- e. Weather conditions were the cause for the temperature excursions.

Table 5. Concentration of Nonradioactive Effluents
July, 1973

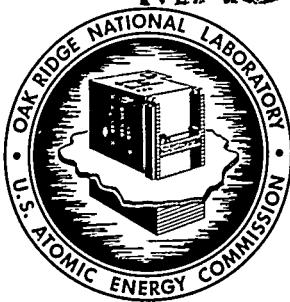
Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.090	2.500	0.085	<0.005
Zn	0.1	0.008	0.020	<0.005	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.08	0.06	0.054	0.010
NO ₃ (as N)	10	0.16	0.24	0.14	0.03
Hg	0.005	0.0004	<0.0001	0.0002	<0.0001
Phenols	0.1	<0.001	0.002	0.002	0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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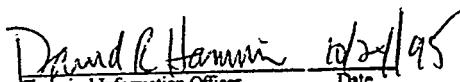
DATE: November 21, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:


David R. Hamm 10/24/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1973, was 0.11% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.086% MPC_W, 0.015% MPC_W, and 0.006% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 229 gph.

	<u>Gallons</u>
Total volume generated	153,000
Volume transferred to evaporator	165,000
Tank Farm free space at beginning of month	451,000
Tank Farm free space at end of month	453,000
Evaporator concentrate returned to tank farm	10,000
Volume of concentrate available for hydrofracture (South Tank Farm)	95,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	25,300
Fission Products Development Laboratory	22,600
ORR and BSR	10,300
High Flux Isotope Reactor	14,600
Radioisotopes Processing Area	14,800
4500 Complex	8,000
Transuranium Processing Area	4,900

GASEOUS WASTE

The ORNL stacks discharged 180 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 268 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The ^3H discharge from the Tritium Target Fabrication Building (Building 7025) has been added to the list of gaseous releases shown in Table 3.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards seventeen times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

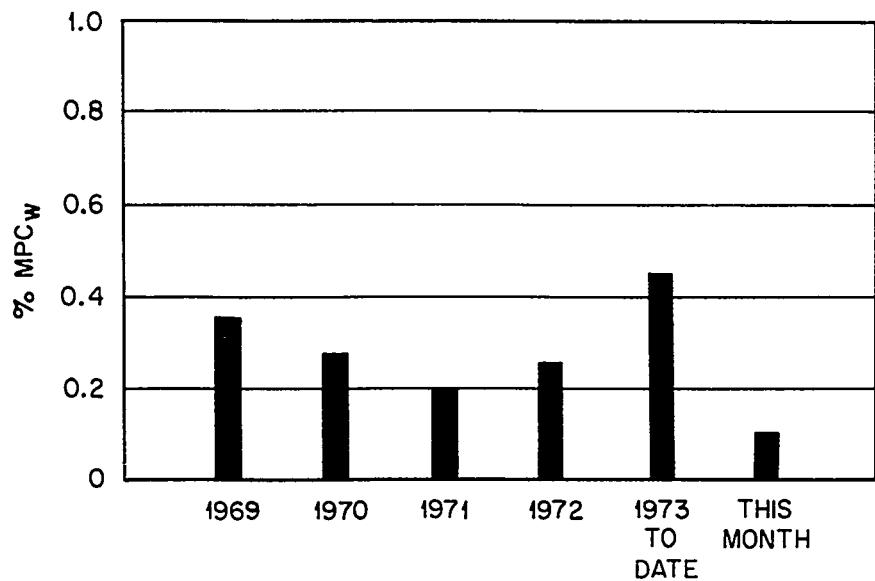


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

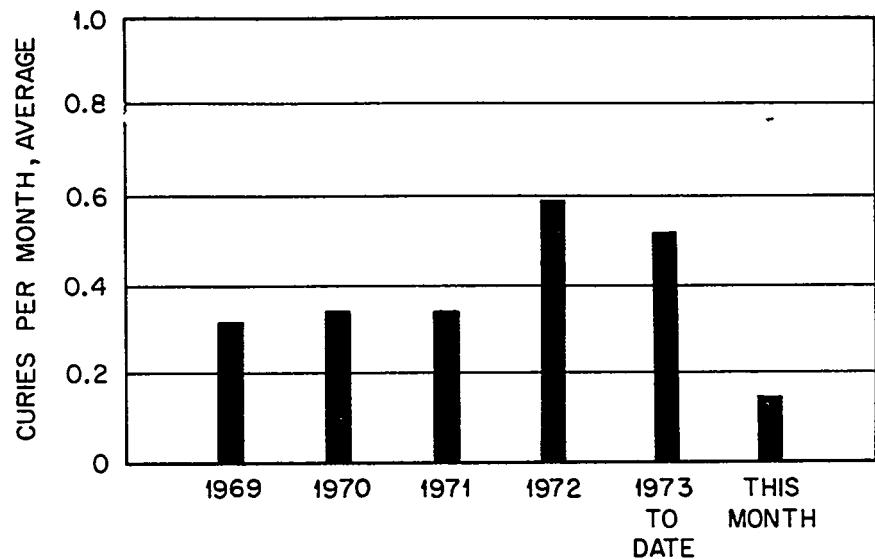


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

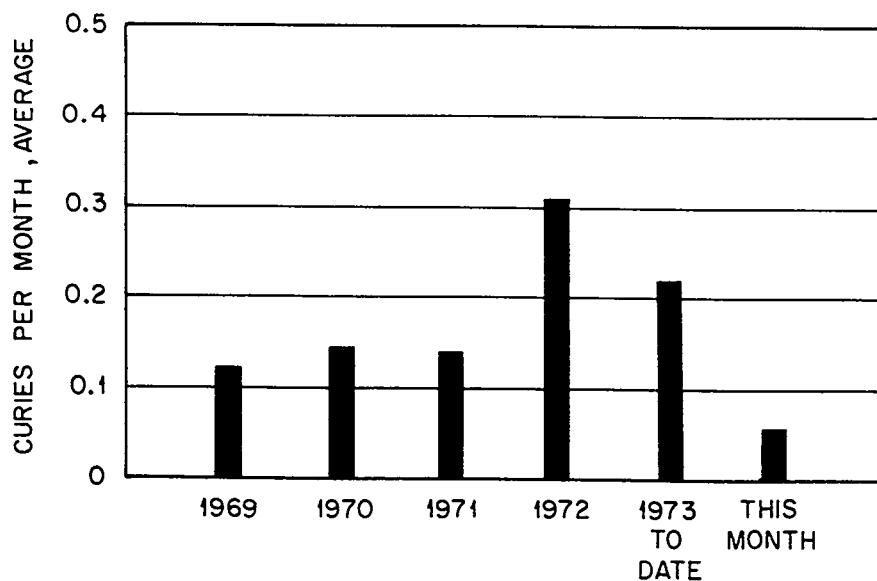


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

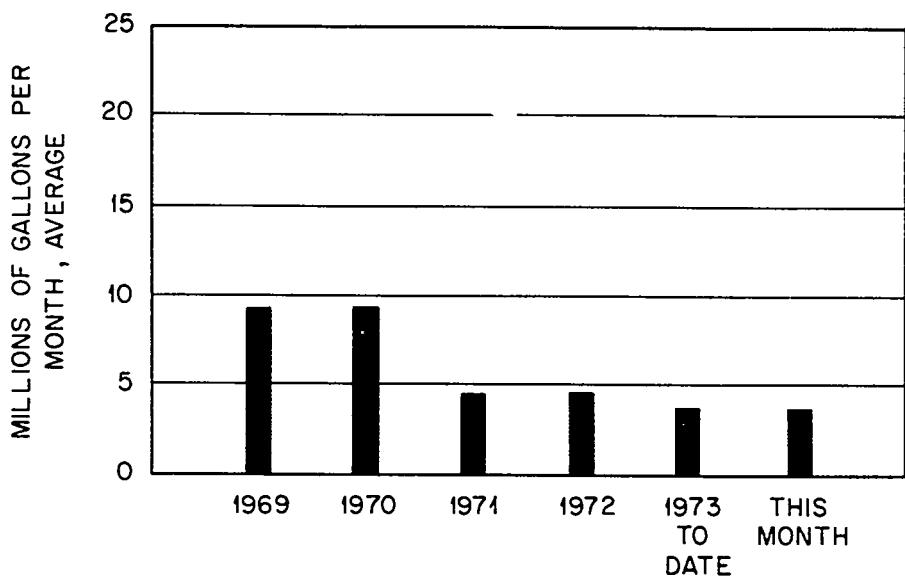


Fig 4. Process Waste Volumes.

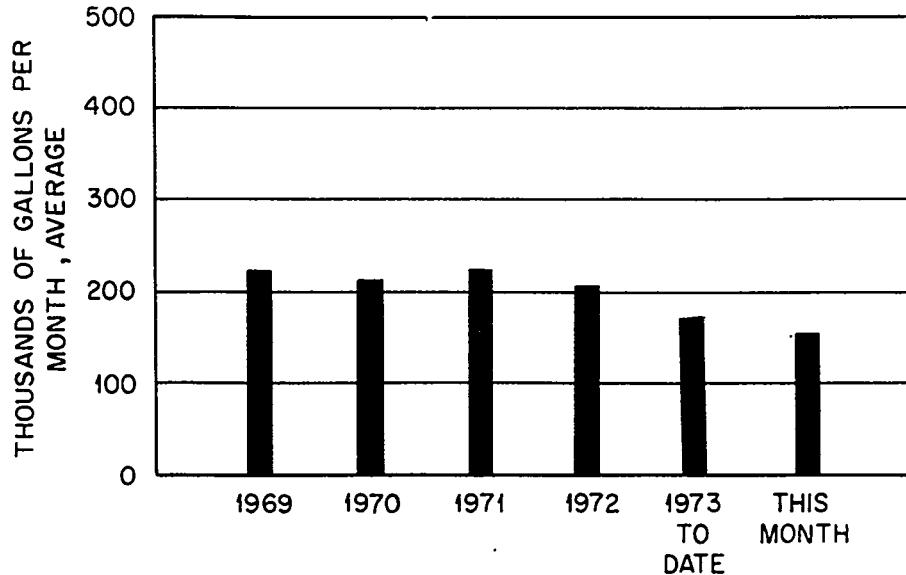


Fig 5. Intermediate - Level Waste Volumes.

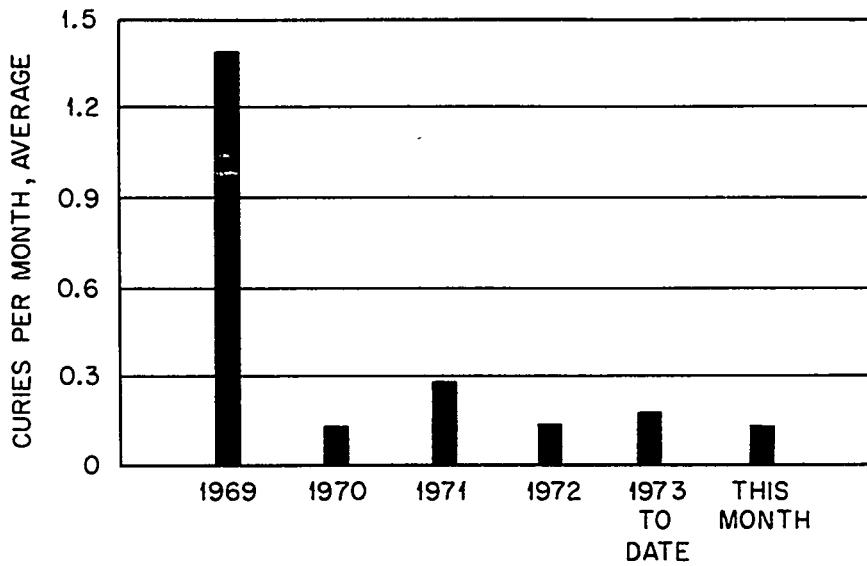


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

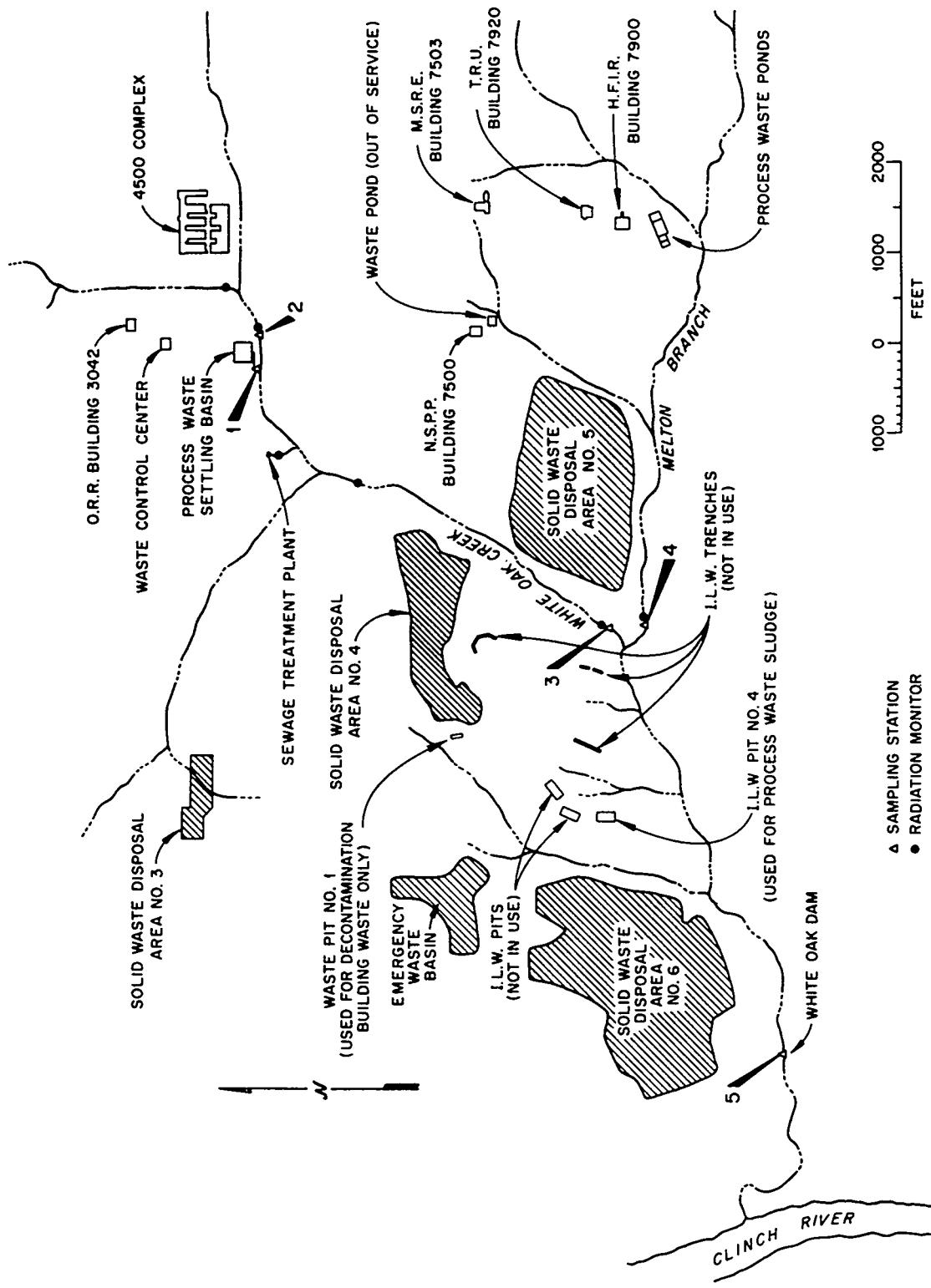


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.06	0.15
Miscellaneous discharges from east end of plant	2	0.01	<0.23
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.35
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.03	0.07
Total discharge from all sources	3,4	0.15	0.42
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.15

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m/ml ^a	Gross-Beta Curies ^b Total	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	120.0	0.04	6.6	0.06	1.4
2. Radiosiotopes Processing Area (MH114 minus MH112)	-	0.26 ^c	42.6	0.55	13.2
3. Reactor Operations (MH112)	8.4	0.02	3.3	0.36	8.7
4. Buildings 3503 and 3508	14.0	0.08	13.1	0.96	23.1
5. Buildings 3025 and 3026	2.4	<0.01	-	0.34	8.2
6. Building 3019	3.5	<0.01	-	0.13	3.1
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	28.1	0.08	13.1	0.52	12.5
9. Buildings 3525 and 3550	≤ 0.5	<0.01	-	0.34	8.2
10. Building 2026	11.3	<0.01	-	0.12	2.9
11. Tank Farm Drainage	30.4	0.13	21.3	0.77	18.5

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.14	196
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.04	70
Total Activity in Gases Released at X-10 Site		0.18	268
Isotopes Division - Y-12 Area		--	0.4
Tritium Target Fabrication Building		1.5 (³ H)	

a Activity primarily ¹³¹I except as noted.

b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam September, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance, Hrs	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	<1 pH unit/day change	3 4 5	9.4 7.9 8.5	4.9 6.8 7.2	17 ^d None None	19.7 - -
Dissolved Oxygen	5 ppm Min.	3 4 5	11.2 10.0 >15.0	<1.0 4.2 5.0	30 9 None	- - -
Temp.	<30°C < 2°C/hr change	3 4 5	28.5 28.7 >30.0	16.0 18.5 20.7	None None 5	- - -

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dSeventeen excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for twelve excursions, the Building 3004 demineralizer was responsible for three excursions, and two were from an unknown source. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
September, 1973

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.115	2.530	0.120	0.010
Zn	0.1	0.027	0.130	<0.005	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.17	0.12	0.08	0.01
NO ₃ (as N)	10	1.17	1.26	0.59	0.19
Hg	0.005	0.0008	<0.0001	0.0003	0.0001
Phenols	0.1	<0.001	<0.001	0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

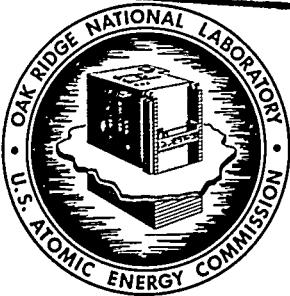
b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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CENTRAL FILES NUMBER

74-1-9

DATE: January 7, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Darryl R. Hennin 10/2/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

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Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of October, 1973, was 0.18% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.14% MPC_W, 0.028% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.2 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 219 gph.

	<u>Gallons</u>
Total volume generated	138,000
Volume transferred to evaporator	163,000
Tank Farm free space at beginning of month	453,000
Tank Farm free space at end of month	475,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture (South Tank Farm)	97,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	16,900
Fission Products Development Laboratory	30,800
ORR and BSR	14,400
High Flux Isotope Reactor	16,100
Radioisotopes Processing Area	25,200
4500 Complex	12,100
Transuranium Processing Area	1,100

GASEOUS WASTE

The ORNL stacks discharged 70 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 279 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

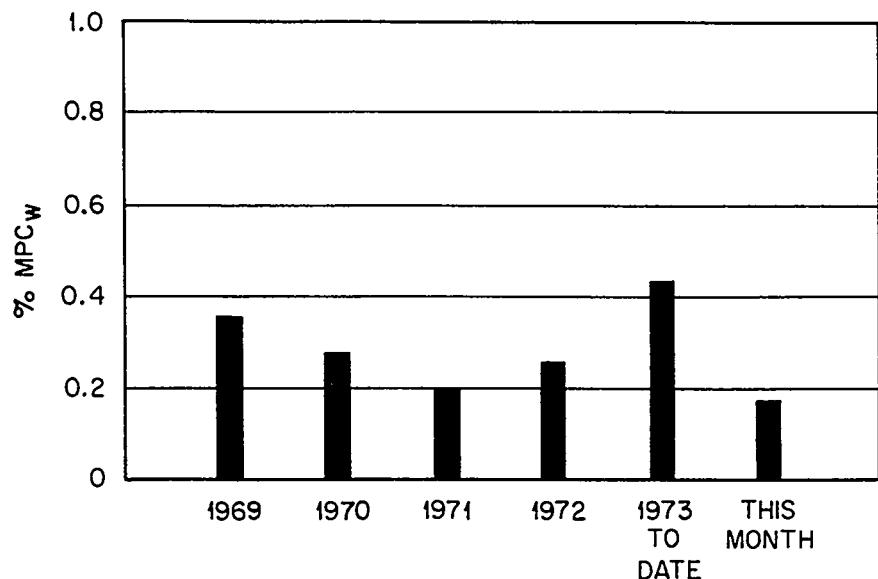


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

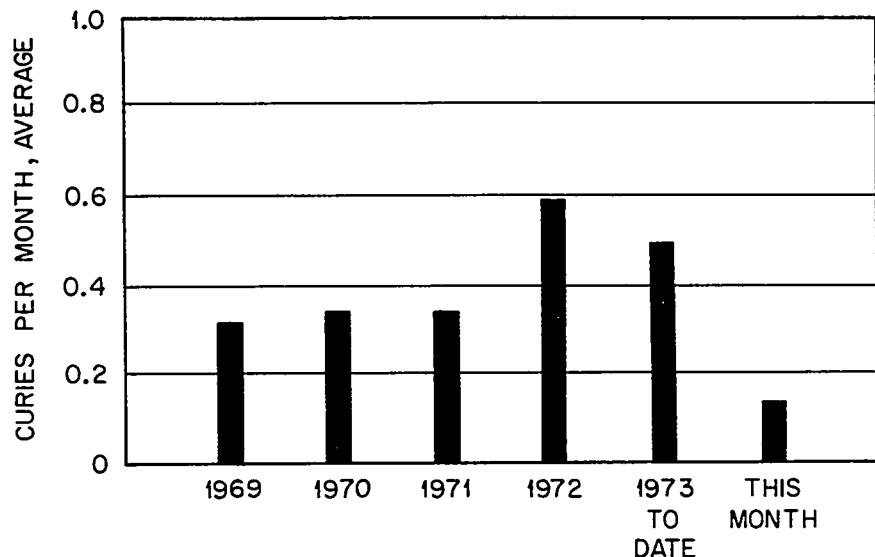


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

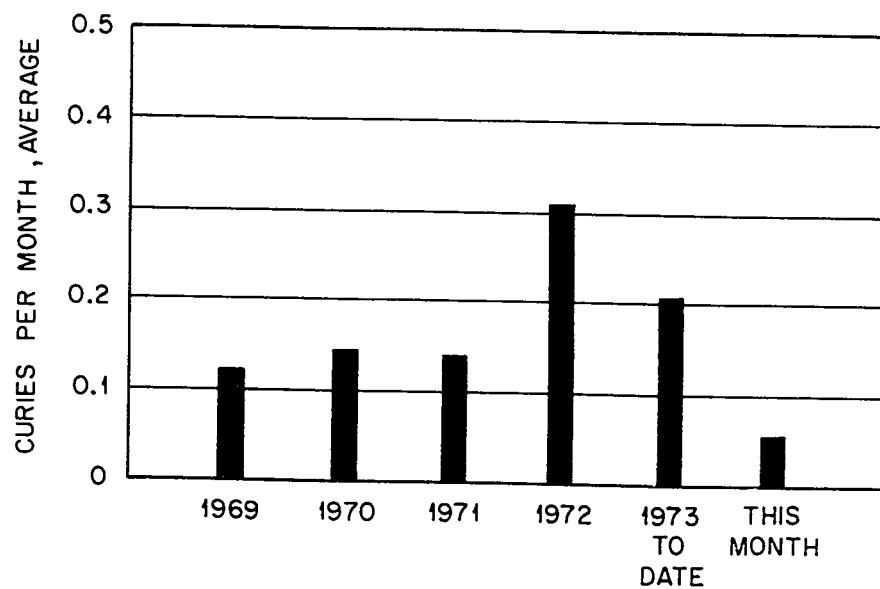


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

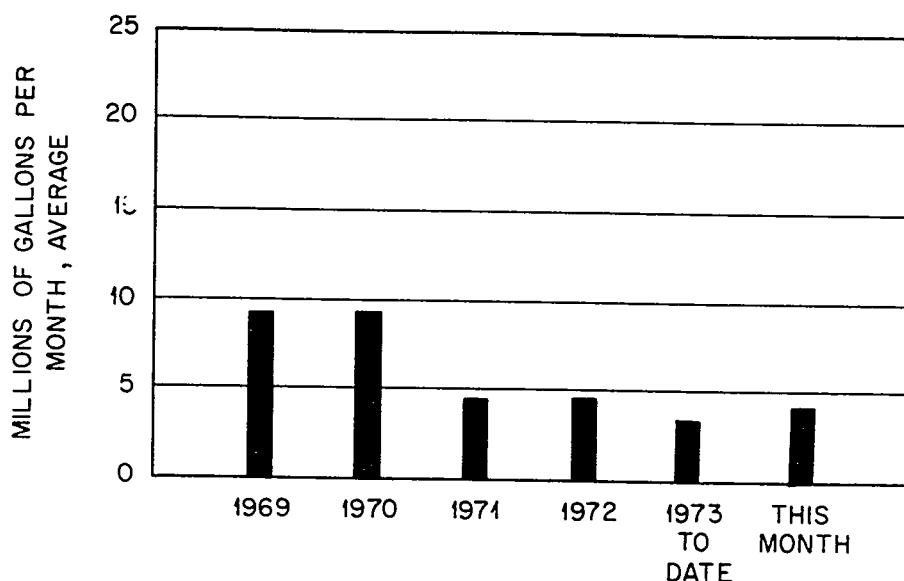


Fig 4. Process Waste Volumes.

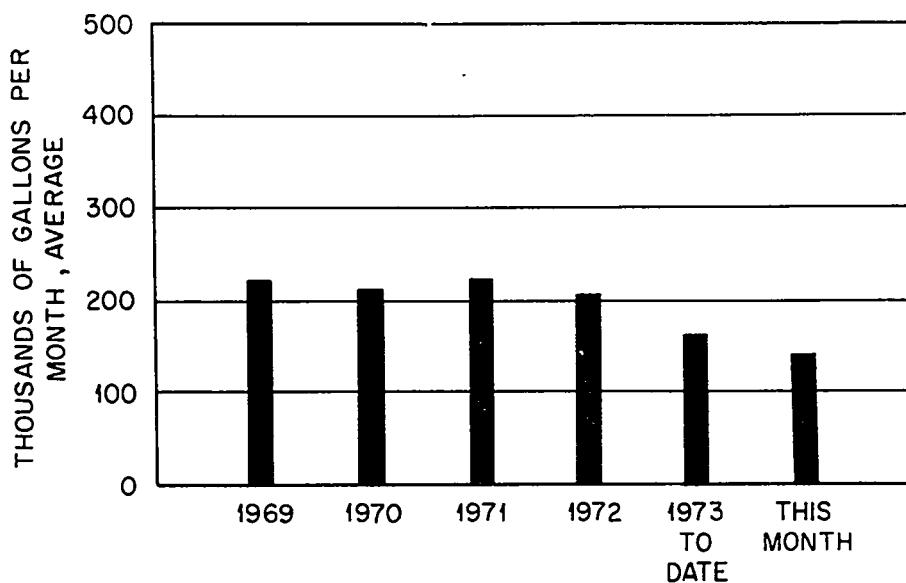


Fig 5. Intermediate - Level Waste Volumes.

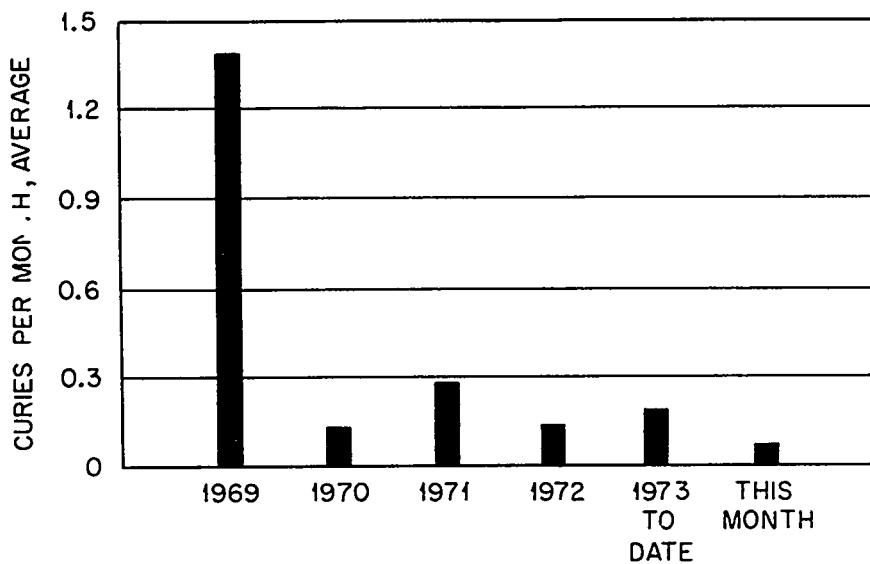


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

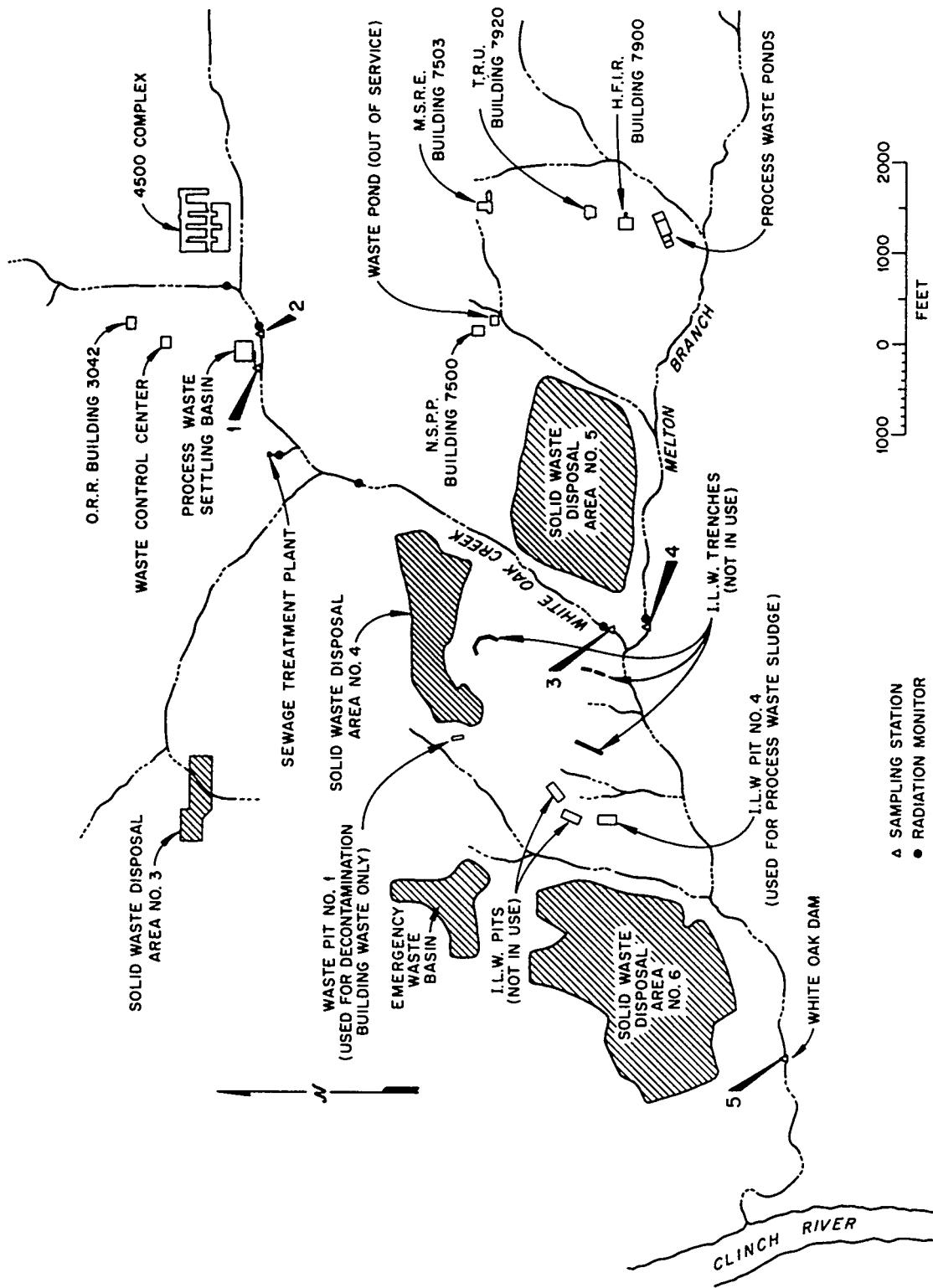


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.06	0.19
Miscellaneous discharges from east end of plant	2	0.01	<0.09
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.31
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.19
Total discharge from all sources	3,4	0.14	0.50
White Oak Dam to Clinch River (Health Physics measurement)	5	0.10	0.17

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ a	Gross-Beta		Gross-Beta		Volume	
		Curies ^b	% of Total	Curies ^b	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	119.2	0.07	10.9	0.11	2.6		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.25 ^c	39.1	0.25	5.9		
3. Reactor Operations (MH112)	5.8	0.01	1.5	0.36	8.4		
4. Buildings 3503 and 3508	16.9	0.09	14.1	1.00	23.5		
5. Buildings 3025 and 3026	2.0	<0.01	-	0.36	8.4		
6. Building 3019	4.2	<0.01	-	0.09	2.1		
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.5		
8. Waste Evaporator, Bldg. 2531	-	-	-	0.59	13.8		
9. Buildings 3525	< 0.01	<0.01	-	0.56	13.2		
10. Building 2026	1.0	<0.01	-	0.12	2.8		
11. Tank Farm Drainage	49.2	0.22	34.4	0.80	18.8		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a	Filterable
		(Curies)	Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.04	224
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.03	53
Total Activity in Gases Released at X-10 Site		0.07	279
Isotopes Division - Y-12 Area		0.4	
Tritium Target Fabrication Building		0.2 (³ H)	

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam October, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5	3	> 9.5	5.9	21	30
	<1 pH unit/day change	4	7.6	6.9	None	-
		5	8.9	7.2	6	9.7
Dissolved Oxygen	5 ppm Min.	3	11.2	2.1	21	-
		4	11.6	4.3	2	-
		5	>15.0	5.3	None	-
Temp.	<30°C	3	25.5	12.5	None	-
	< 2°C/hr change	4	27.4	13.0	None	-
		5	26.5	13.8	None	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dTwenty-one excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for fourteen excursions, the Building 3004 demineralizer was responsible for seven excursions, and two were from an unknown source. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
October, 1973

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.150	2.710	0.230	0.015
Zn	0.1	0.025	0.212	0.008	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.14	0.09	0.05	<0.01
NO ₃ (as N)	10	1.13	1.01	0.75	0.09
Hg	0.005	0.0004	<0.0001	0.0004	0.0001
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

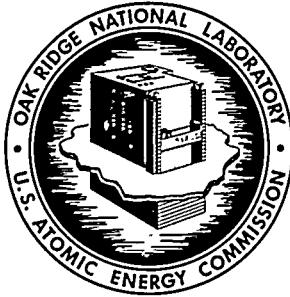
a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL

CENTRAL FILES NUMBER

74-1-20

DATE: January 23, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Herwin 10/24/95

Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1973, was 0.53% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.34% MPC_W, 0.14% MPC_W, and 0.035% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The above-normal ⁹⁰Sr discharge, noted in Table 1 and Figures 2 and 3, is apparently the result of unusually heavy rainfall which increases the amount of ⁹⁰Sr that leaches out of the burial grounds.

Process Waste

A total of 3.8 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 119 gph.

	<u>Gallons</u>
Total volume generated	205,000
Volume transferred to evaporator	143,000
Tank Farm free space at beginning of month	475,000
Tank Farm free space at end of month	408,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture (South Tank Farm)	104,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	25,200
Fission Products Development Laboratory	31,200
ORR and BSR	22,500
High Flux Isotope Reactor	26,200
Radioisotopes Processing Area	17,800
4500 Complex	11,900
Transuranium Processing Area	6,000

GASEOUS WASTE

The ORNL stacks discharged 130 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 292 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.9% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards twenty-seven times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river. Chromium continues to be out of tolerance at Stations 3, 4, and 5 and zinc is out of tolerance at Station 4. The facility for recycling the HFIR cooling tower blowdown is nearing completion and, when in operation, should eliminate the chromium and zinc problems in Melton Branch and White Oak Lake.

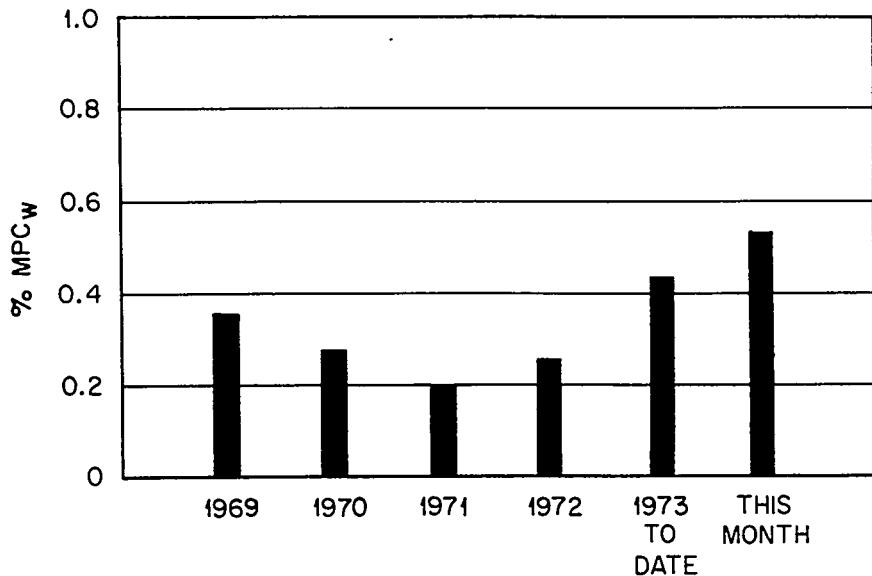


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

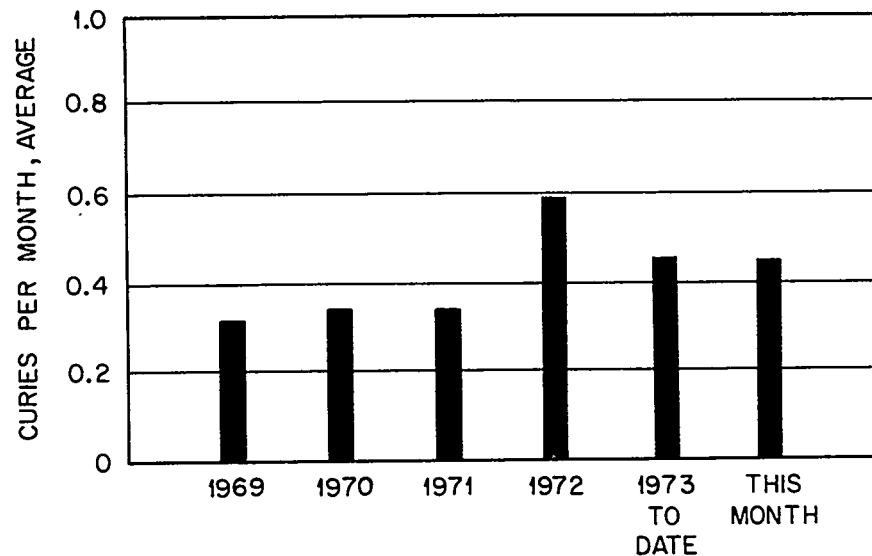


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

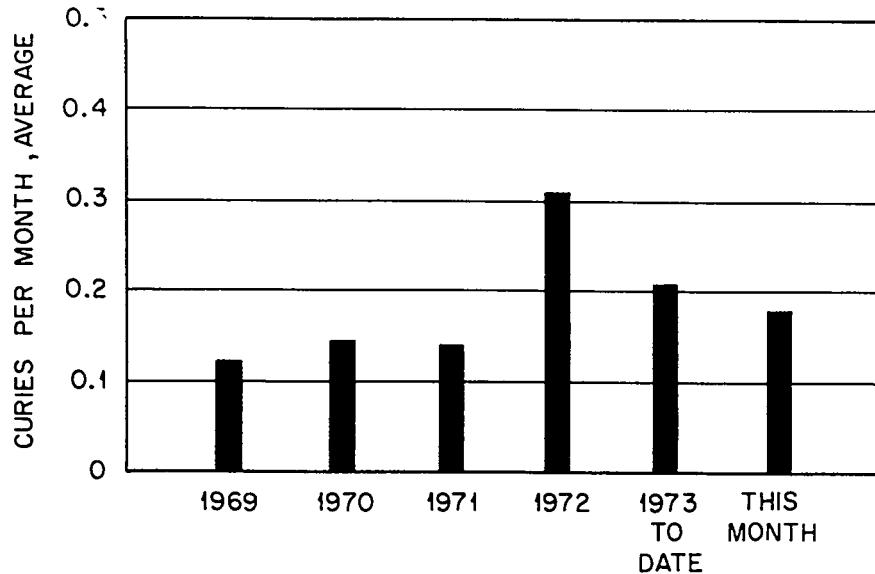


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

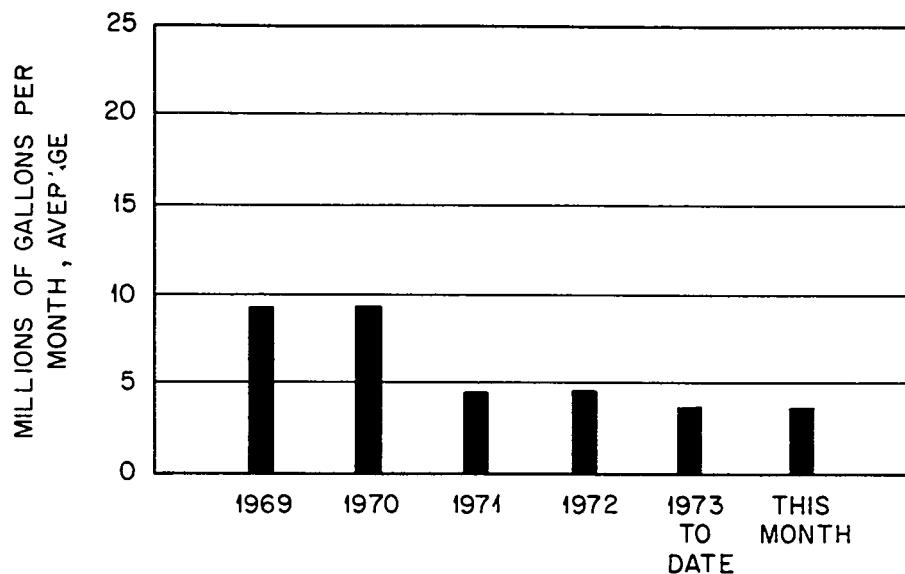


Fig 4. Process Waste Volumes.

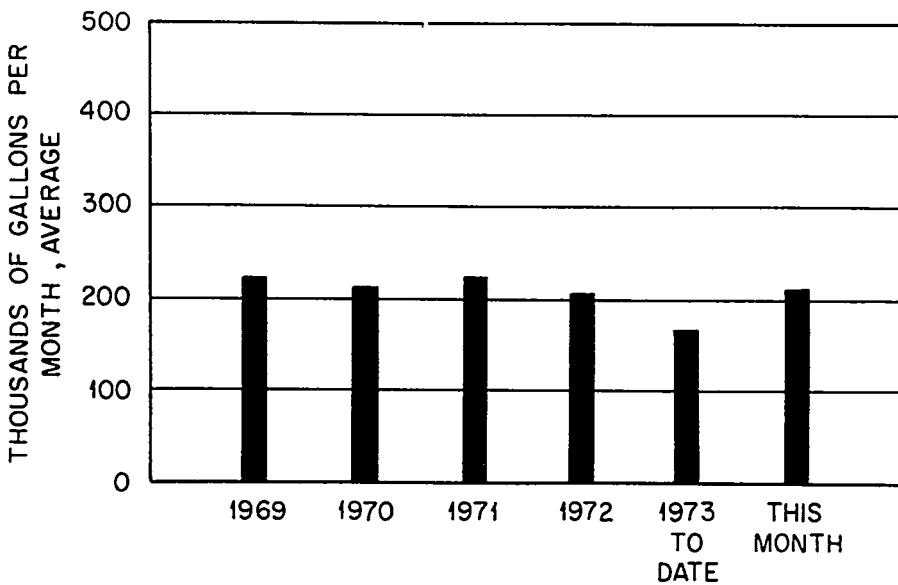


Fig 5. Intermediate - Level Waste Volumes.

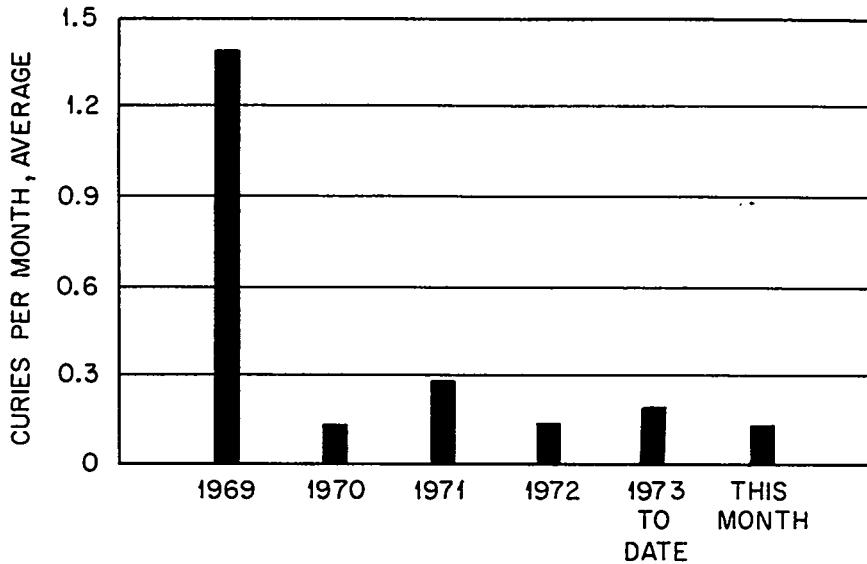


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

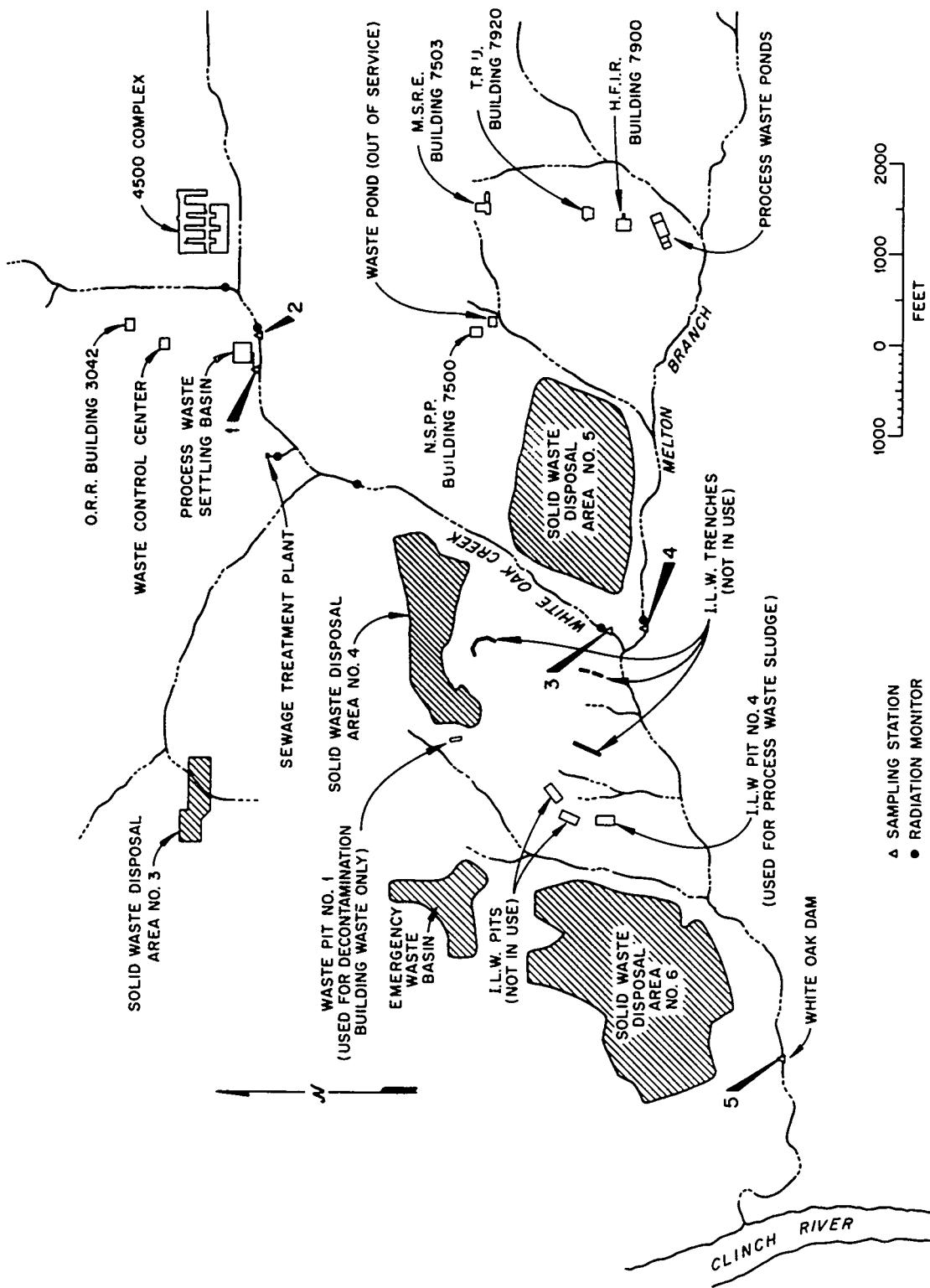


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies		Gross Beta, Curies ^b
		1	0.18	
Miscellaneous discharges from east end of plant	2	0.02		<0.17
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.40		0.88
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.05		0.11
Total discharge from all sources	3,4	0.45		0.99
White Oak Dam to Clinch River (Health Physics measurement)	5	0.47		1.23

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m/ml ^a	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Curies ^b Total	% of Total	Curies ^b Total	% of Total		
1. Radioisotopes Processing Area (MH234)	96.3	0.05	6.8	0.10	2.4		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.28 ^c	38.4	0.29	6.8		
3. Reactor Operations (MH112)	4.9	0.01	1.4	0.48	11.3		
4. Buildings 3503 and 3508	14.0	0.08	10.9	1.05	24.8		
5. Buildings 3025 and 3026	4.0	<0.01	-	0.29	6.8		
6. Building 3019	6.2	<0.01	-	0.15	3.5		
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.5		
8. Waste Evaporator, Bldg. 2531	10.1	0.03	4.1	0.48	11.3		
9. Building 3525	< 0.1	<0.01	-	0.26	6.2		
10. Building 2026	0.6	<0.01	-	0.12	2.8		
11. Tank Farm Drainage	49.3	0.28	38.4	1.00	23.6		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.12	261
Radiochemical-Processing Pilot Plant	3020	0	8
MSRE	7512	0	0
HFIR	7911	0.01	23
Total Activity in Gases Released at X-10 Site		0.13	292
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		0.5 (³ H)	

^aActivity primarily ¹³¹I except as noted.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam November, 1973

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance, Hrs	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	<1 pH unit/day change	3	5.6	>9.5	27 ^d	36
		4	6.5	7.9	None	-
Dissolved Oxygen	5 ppm Min.	5	6.9	8.1	None	-
		3	3.2	11.8	2	-
Temp.	<30°C < 2°C/hr change	4	5.4	>15.0	None	-
		5	5.0	10.6	None	-
		3	7.0	20.1	None	-
		4	10.5	22.5	None	-
		5	12.0	22.0	None	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dTwenty-seven excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for twenty-three excursions, and the Building 3004 demineralizer was responsible for four excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

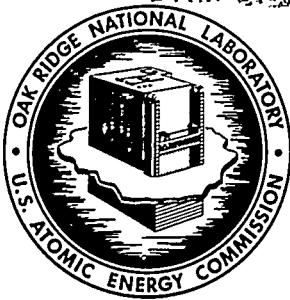
Table 5. Concentration of Nonradioactive Effluents
November, 1973

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.120	2.370	0.230	0.030
Zn	0.1	0.020	0.230	<0.005	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.16	0.08	0.08	0.02
NO ₃ (as N)	10	0.90	0.86	0.65	0.14
Hg	0.005	0.0004	0.0005	0.0003	0.0003
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL
CENTRAL FILES NUMBER

74-3-20

DATE: March 27, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David C. Johnson (6/24/95)
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS
Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of January, 1974, was 0.28% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.23% MPC_W and 0.05% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The heavy rainfall during January has again resulted in high discharges of ⁹⁰Sr from the burial grounds. As noted in the December report, the ⁹⁰Sr discharged from the burial grounds is proportional to the flow in White Oak Creek. The creek flow for January is the highest recorded in recent years.

Process Waste

A total of 4.0 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The above-normal ⁹⁰Sr discharge from the PWTP is again the result of the heavy rains. The ⁹⁰Sr input to the PWTP was higher than usual but not because of any particular source.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 219 gph.

	<u>Gallons</u>
Total volume generated	179,000
Volume transferred to evaporator	163,000
Tank Farm free space at beginning of month	454,000
Tank Farm free space at end of month	435,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture (South Tank Farm)	118,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volume of ILW generated each month.

	<u>Gallons</u>
Building 3019	36,100
Fission Products Development Laboratory	19,400
ORR and BSR	25,500
High Flux Isotope Reactor	22,200
Radioisotopes Processing Area	21,300
4500 Complex	10,700
Transuranium Processing Area	3,300

GASEOUS WASTE

The ORNL stacks discharged 240 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 514 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.9% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS
Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards forty-three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

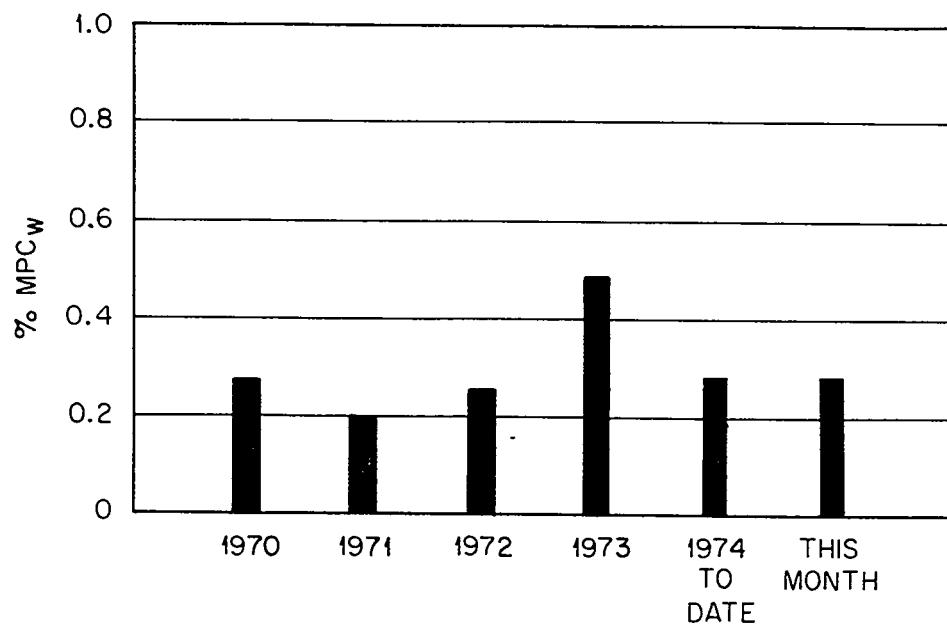


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

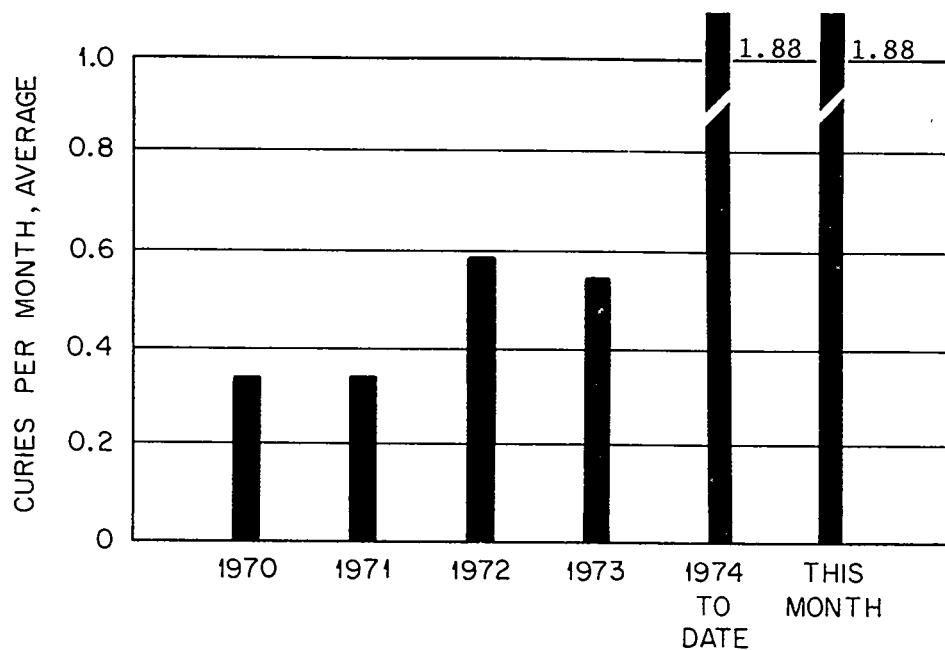


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7.).

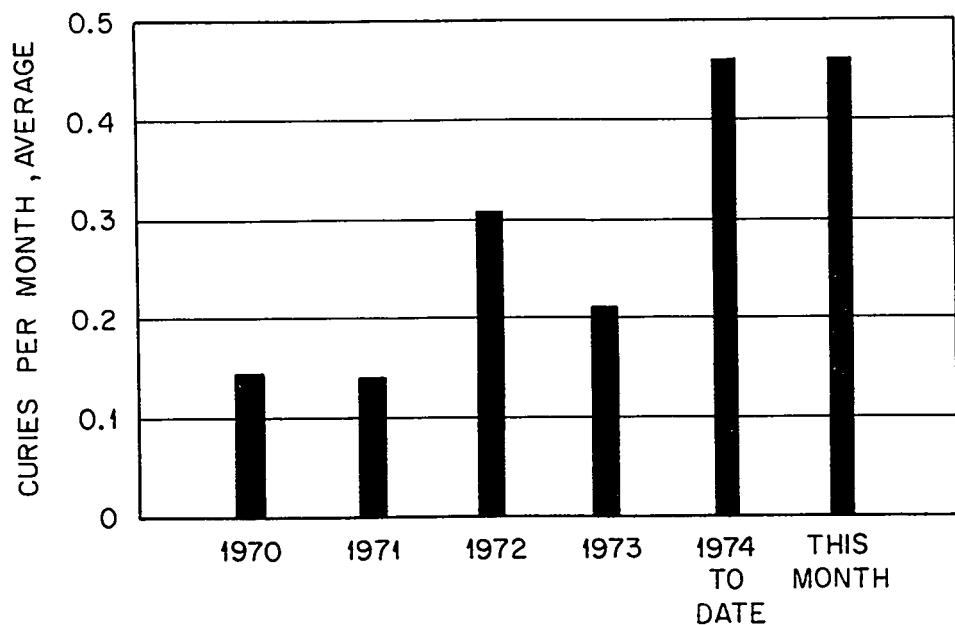


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

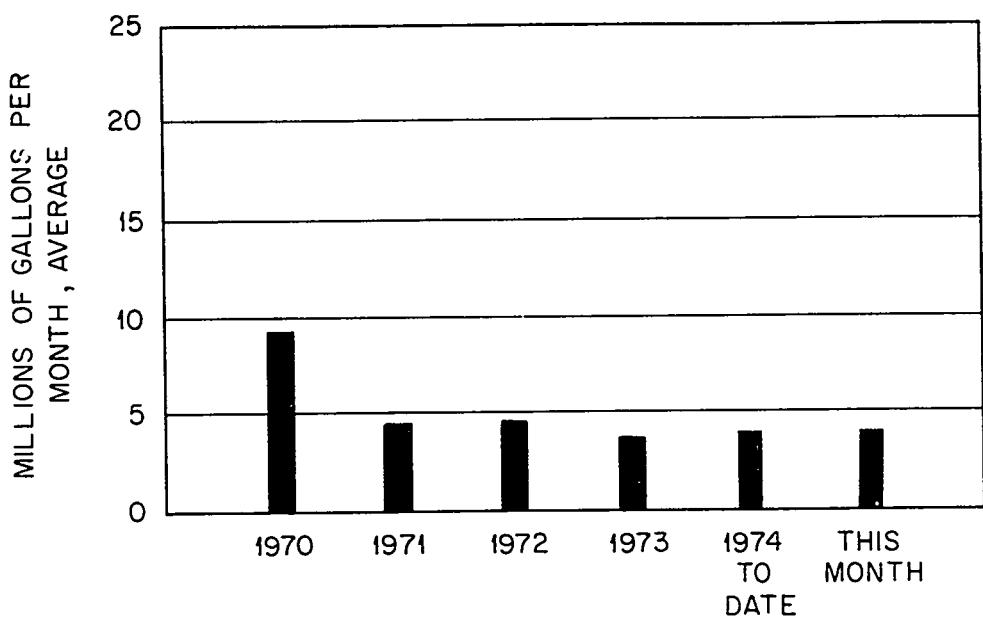


Fig 4. Process Waste Volumes.

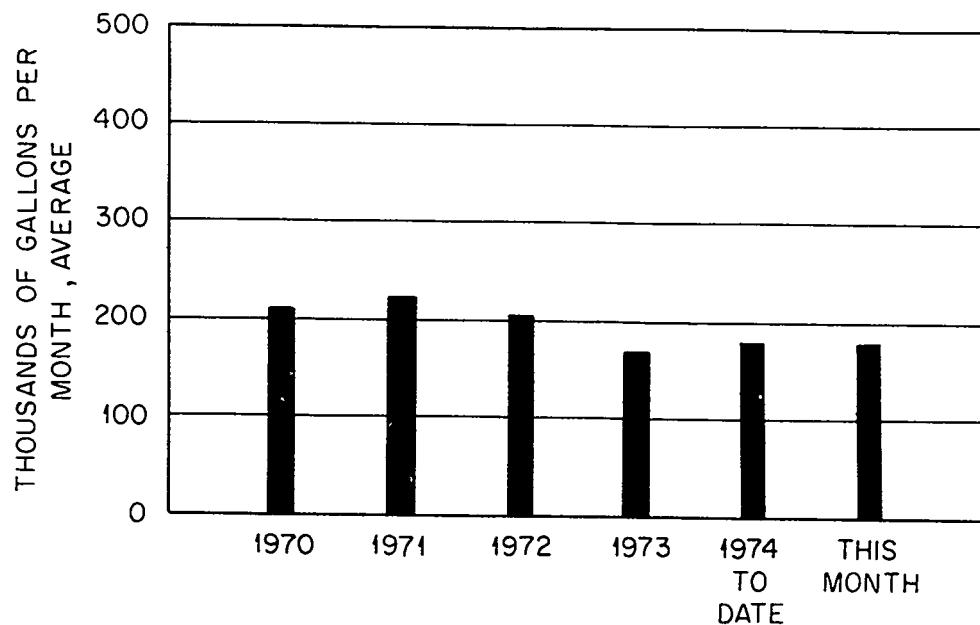


Fig 5. Intermediate - Level Waste Volumes.

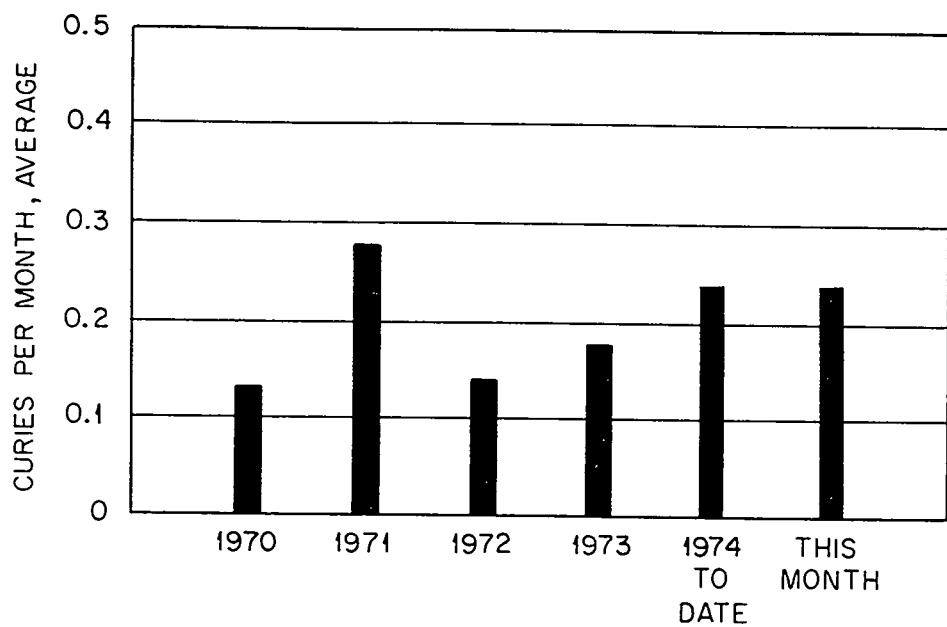


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

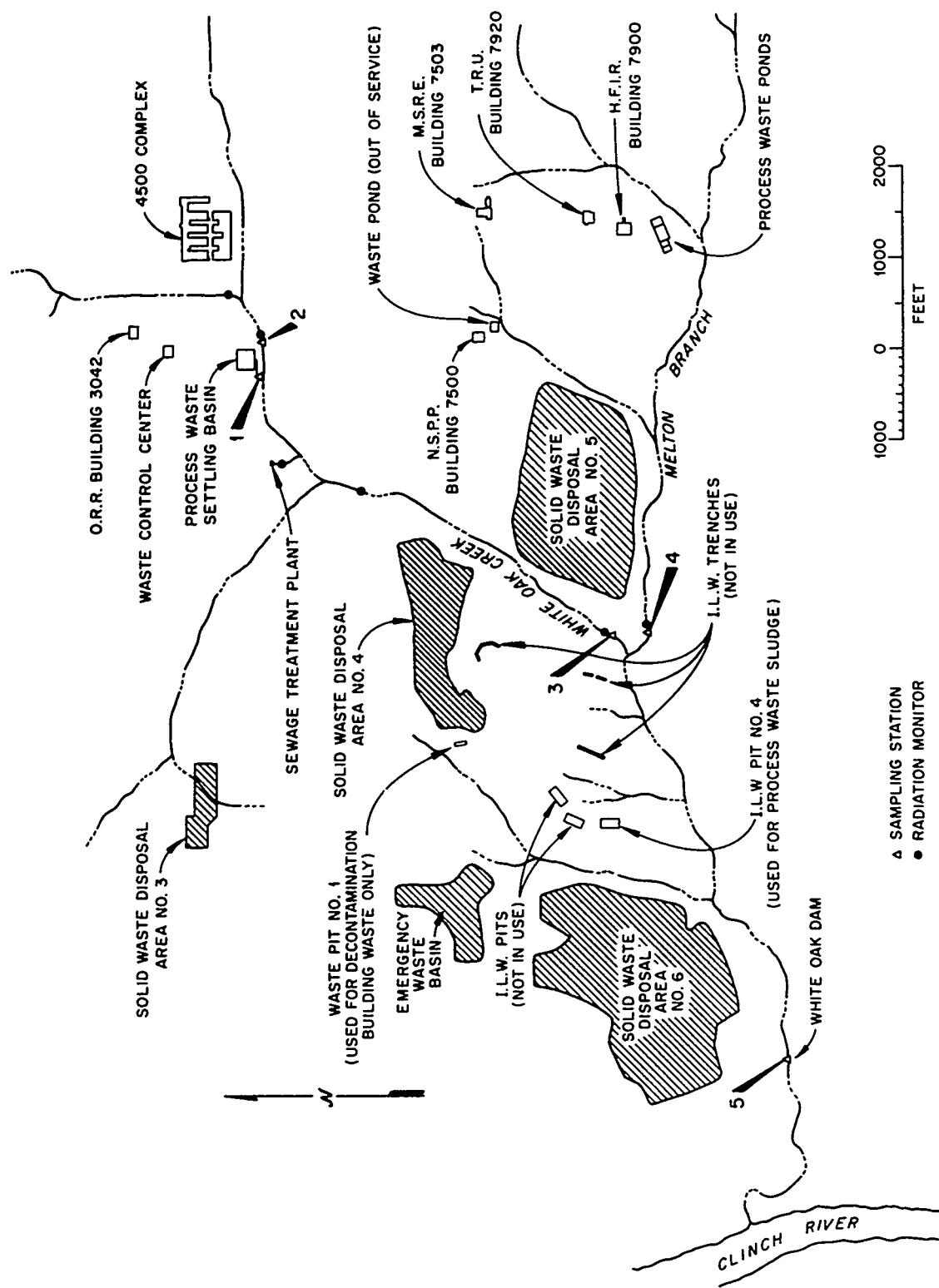


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Numbera	Total Sr, Curies	Gross Beta, Curiesb
Process Waste			
Miscellaneous discharges from east end of plant	1	0.46	0.74
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.11	0.93
Discharge from Melton Valley Operations and Burial Ground No. 5	3	1.61	3.03
Total discharge from all sources	4	0.27	0.46
White Oak Dam to Clinch River (Health Physics measurement)	3,4 5	1.88 1.58	3.49 2.2

a Refers to Fig. 7.

b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ ^a	Gross-Beta		Gross-Beta		Volume Million Gallons *	% of Total
		Curies ^b	% of Total	Curies ^b	% of Total		
1. Radioisotopes Processing Area (MH234)	123	0.03	2.0	0.05	1.0		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.34 ^c	22.5	0.66	12.7		
3. Reactor Operations (MH112)	150	0.38 ^d	25.2	0.45	8.6		
4. Buildings 3503 and 3508	31.7	0.20	13.2	1.14	21.9		
5. Buildings 3025 and 3026	5.7	<0.01	-	0.22	4.2		
6. Building 3019	12.3	0.01	0.7	0.15	2.9		
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4		
8. Waste Evaporator, Bldg. 2531	8.5	0.02	1.3	0.43	8.3		
9. Building 3525	<0.2	<0.01	-	0.05	1.0		
10. Building 2026	<0.3	<0.01	-	0.17	3.3		
11. Tank Farm Drainage	50.4	0.53	35.1	1.86	35.7		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.^dThis value is apparently high since it is not reflected in the measurement obtained at MH-114, which is a normal discharge.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.23	502
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	11
Total Activity in Gases Released at X-10 Site		0.24	514
Isotopes Division - Y-12 Area		0.4	0
Tritium Target Fabrication Building	7025	6.7 ^c (³ H)	

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.^cThis value represents the discharge for the months of December, 1973, and January, 1974.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam January, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5	3	5.4	9.0	43	23.4
	<1 pH unit/day change	4	6.7	7.6	None	-
		5	6.8	7.4	None	-
Dissolved Oxygen	5 ppm Min.	3	5.9	12.6	None	-
		4	7.9	12.3	None	-
		5	8.0	12.3	None	-
Temp.	<30°C < 2°C/hr change	3	8.0	15.5	None	-
		4	7.1	15.2	None	-
		5	7.1	15.2	None	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dForty-three excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for thirty-six excursions and the Building 3004 demineralizer was responsible for seven excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
January, 1974

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.040	0.350	0.065	2.74 ^c
Zn	0.1	0.008	0.016	<0.005	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.03	0.01	0.002	0.01
NO ₃ (as N)	10	0.26	0.10	0.24	1068 ^c
Hg	0.005	0.0002	<0.0001	0.0001	<0.0001
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

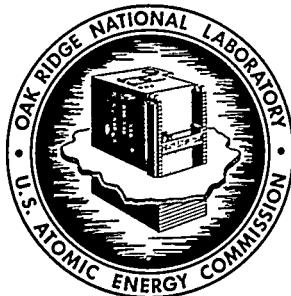
- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This Clinch River sample was apparently contaminated in some manner because the high Cr and NO₃ analyses reported were not reflected in the Clinch River samples taken for the same period of time at K-25.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DATE ISSUED

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ORNL

CENTRAL FILES NUMBER

74-6-40

DATE: June 7, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Daniel R. Marvin (6/24/95)

Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1974, was 0.36% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.27% MPC_W, 0.05% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Part of the above-normal discharges from the process-waste system is apparently due to a heavy accumulation of precipitate in the outlet end of the Process Waste Treatment Plant. This results in a carry-over of the precipitate in the outlet stream from the plant. The PWTP has been scheduled for a shutdown to permit clean-up of the facility.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 134 gph.

	<u>Gallons</u>
Total volume generated	106,000
Volume transferred to evaporator	100,000
Tank Farm free space at beginning of month	431,000
Tank Farm free space at end of month	421,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydro-fracture (South Tank Farm)	140,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	14,900
Fission Products Development Laboratory	3,700
ORR and BSR	18,100
High Flux Isotope Reactor	7,900
Radioisotopes Processing Area	11,500
4500 Complex	12,700
Transuranium Processing Area	3,700

GASEOUS WASTE

The ORNL stacks discharged 90 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 352 μCi . The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.1% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The ^3H discharge from the Tritium Target Fabrication Building (Building 7025) was 2.5 curies for the month.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

The mercury analysis for White Oak Creek is above the standard and is about ten times higher than the average for the past year. Similar analyses for White Oak Dam and the Clinch River are also about ten times higher than the average. Since the mercury content in the Clinch River is not related to that in White Oak Creek or White Oak Dam, it is felt that an error may have occurred in the preparation of the acidic solutions used in the containers provided for collecting the monthly samples. A subsequent grab sample from White Oak Creek did not indicate a high mercury content.

NONROUTINE MAINTENANCE

The following items of nonroutine maintenance were performed during the month.

1. The circulating pump at the White Oak Creek Monitoring Station at Lagoon Road was overhauled.
2. The South Tank Farm Moyno pump was reworked.
3. The diaphragm on PCV-61, a pneumatic control valve on the steam supply line to the north turbine, was replaced.
4. The sequence timer on the 3039 Emergency Diesel Generator Control System was replaced.

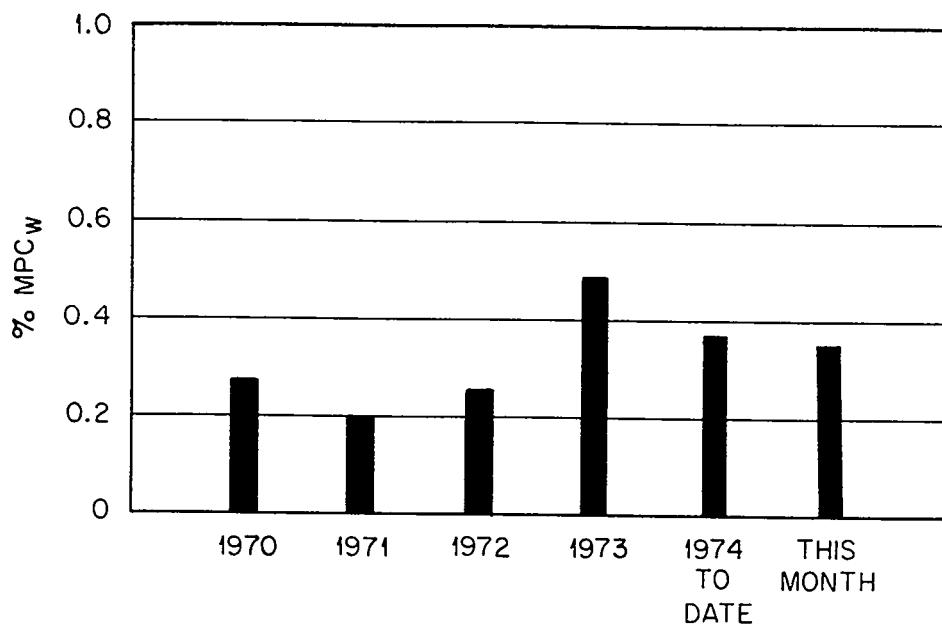


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

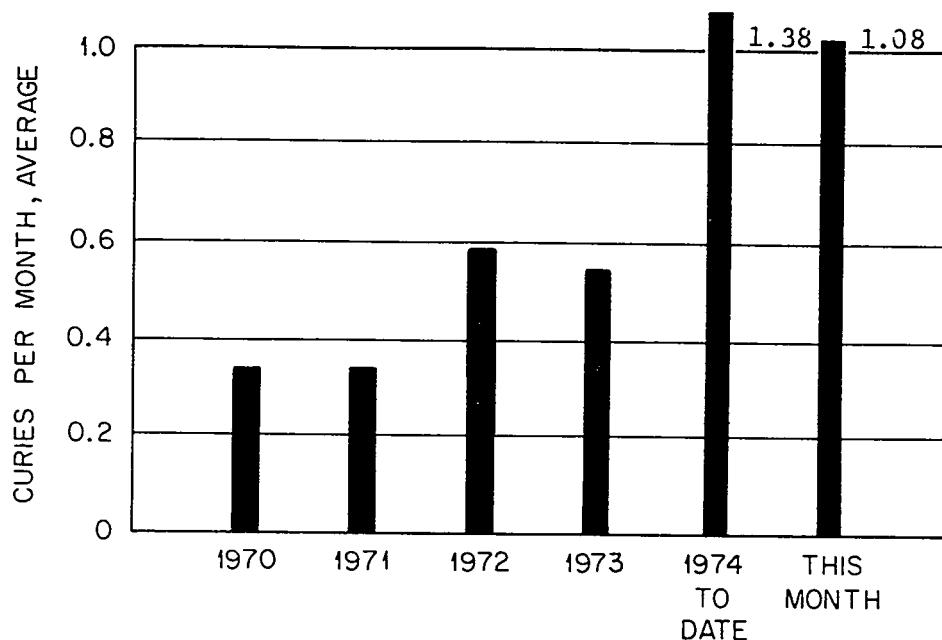


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7.).

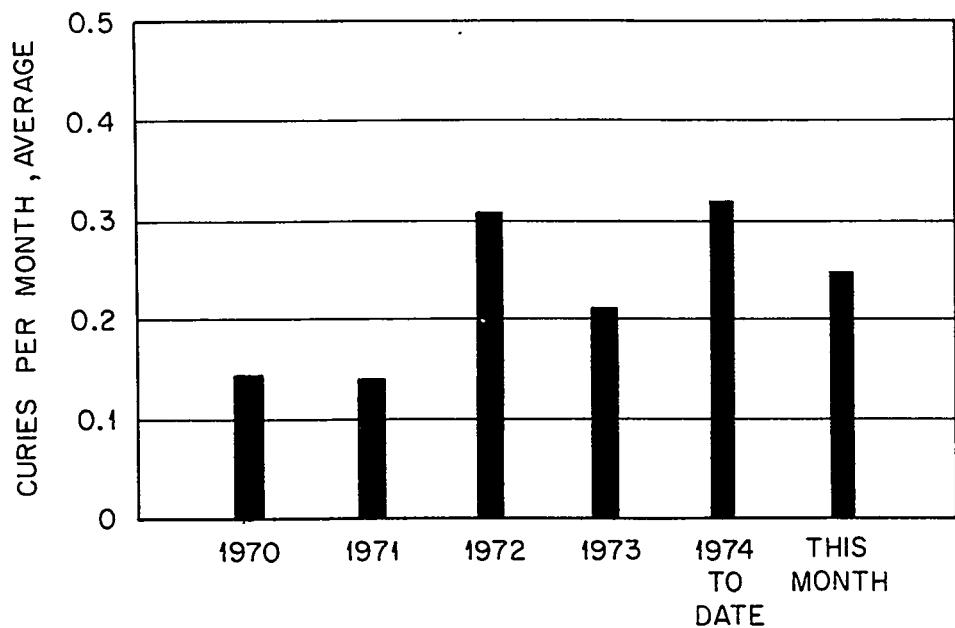


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

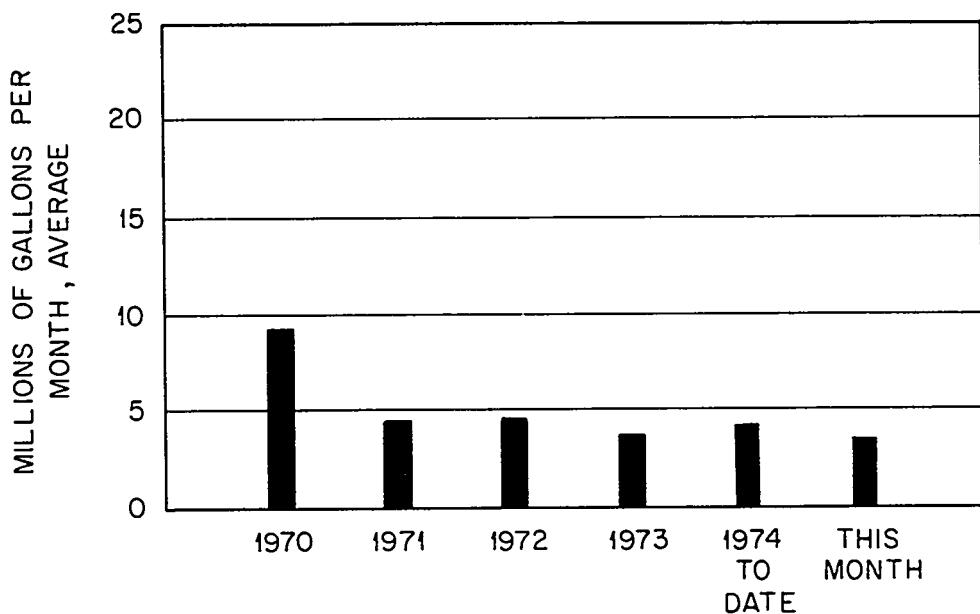


Fig 4. Process Waste Volumes.

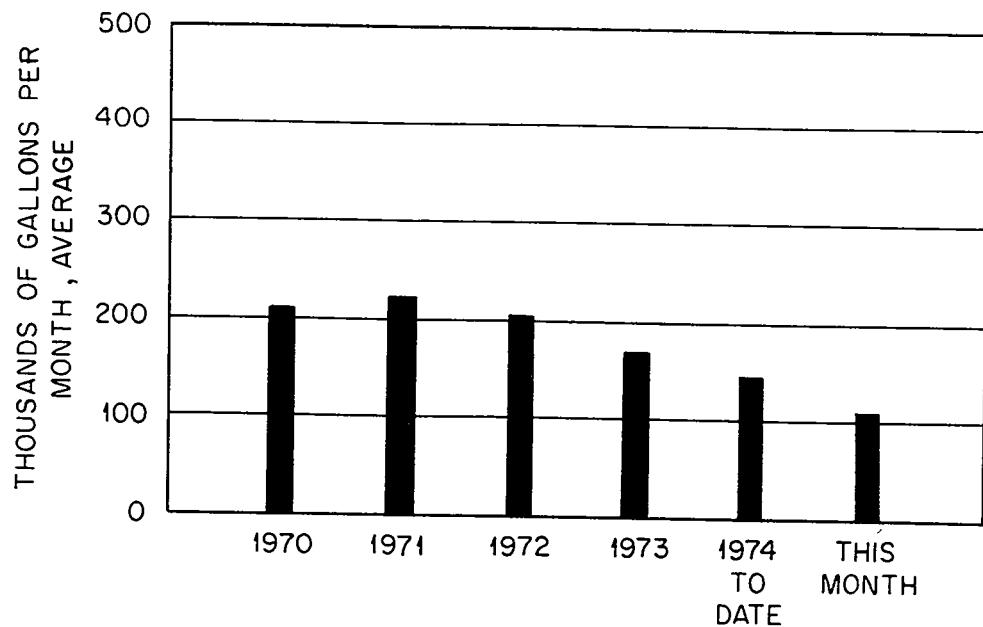


Fig 5. Intermediate - Level Waste Volumes.

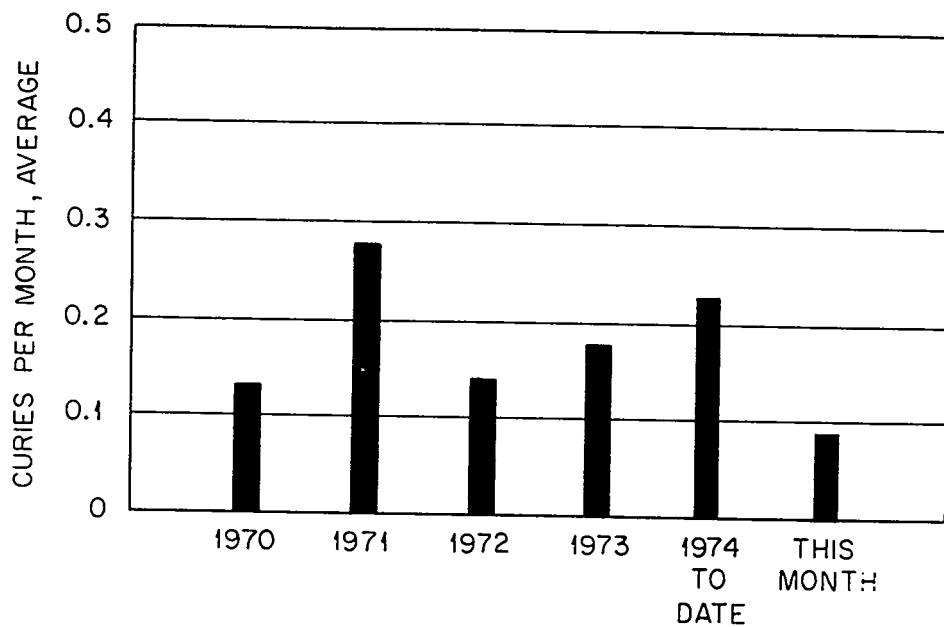


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

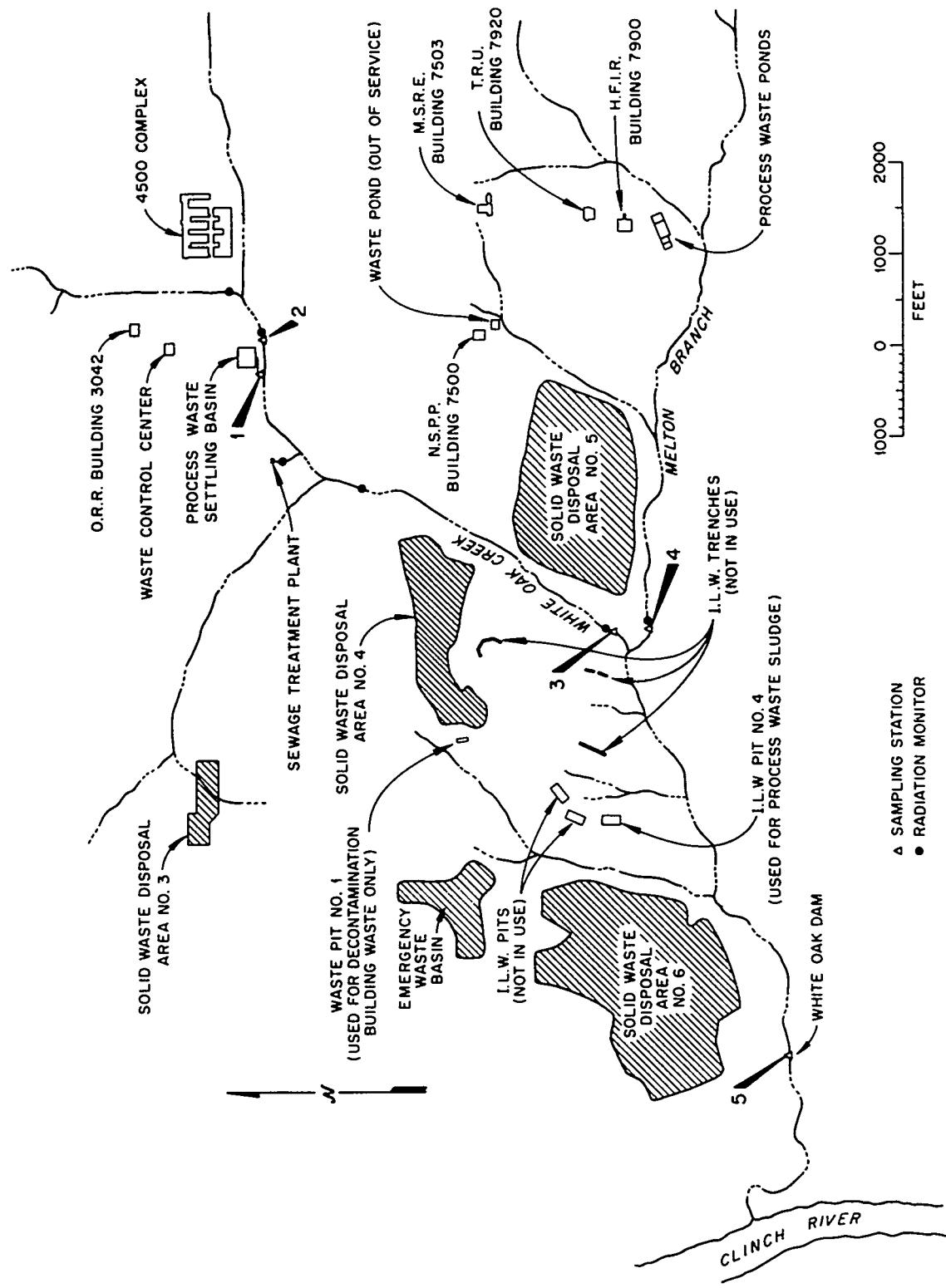


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.25	0.43
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.07	<0.20
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.90	1.50
Total discharge from all sources	4	0.18	0.25
White Oak Dam to Clinch River (Health Physics measurement)	3,4	1.08	1.75
	5	0.45	0.63

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ ^a	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Curies ^b	% of Total	Curies ^b	% of Total		
1. Radioisotopes Processing Area (MH234)	104	0.03	4.8	0.05	1.5		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.31 ^c	50.0	0.50	15.1		
3. Reactor Operations (MH112)	< 0.2	<0.01	-	0.37	11.1		
4. Buildings 3503 and 3508	25.2	0.06	9.7	0.40	12.1		
5. Buildings 3025 and 3026	2.7	<0.01	-	0.21	6.3		
6. Building 3019	4.5	<0.01	-	0.22	6.6		
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3		
8. Waste Evaporator, Bldg. 2531	9.8	0.01	1.6	0.23	6.9		
9. Building 3525	< 0.2	<0.01	-	0.07	2.1		
10. Building 2026	< 0.3	<0.01	-	0.13	3.9		
11. Tank Farm Drainage	33.5	0.21	33.9	1.13	34.1		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)		Filterable Particulate Activity ^b (Microcuries)
		Filterable	Particulate	
HRLAL	2026	0	0	-
Central Radioactive Gas Disposal Facilities	3039	0.08	335	
Radiochemical-Processing Pilot Plant	3020	0	1	
MSRE	7512	0	-	
HFIR	7911	0.01	16	
Total Activity in Gases Released at X-10 Site		0.09	352	
Isotopes Division - Y-12 Area			0.4	
Tritium Target Fabrication Building		2.5 (³ H)		

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam April, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH change	6.5-8.5 <1 pH unit/day	3 4 5	5.4 6.4 6.9	9.4 8.0 8.9	33 ^d None 6 ^e	26.4 - 26.0
	5 ppm Min.	3 4 5	2.4 5.0 6.3	8.0 14.1 > 15.0	8 ^f None None	66.5 - -
Dissolved Oxygen Temp. <30°C < 2°C/hr change	5 ppm Min.	3 4 5	10.7 7.5 13.2	22.9 25.2 25.1	None None None	- - -
	5 ppm Min.	3 4 5	10.7 7.5 13.2	22.9 25.2 25.1	None None None	- - -
	5 ppm Min.	3 4 5	10.7 7.5 13.2	22.9 25.2 25.1	None None None	- - -

aThese measurements are continuous and are recorded.

bThese are Tennessee Water Quality Criteria standards.

cRefer to Figure 7.

dThirty-three excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 27 excursions, and the Building 3004 de-mineralizer was responsible for six excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

eThe pH excursions in White Oak Lake were apparently the result of a gradual increase in the pH in the lake due to natural causes and not to Laboratory operations.

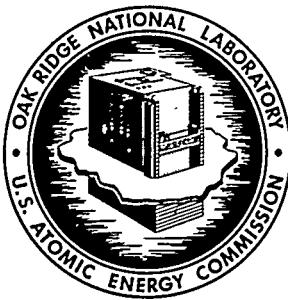
fWhen the Secondary Sewage Treatment Plant, currently under construction, is placed in operation, the dissolved oxygen in White Oak Creek should remain above 5 ppm.

Table 5. Concentration of Nonradioactive Effluents
April, 1974

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.050	0.060	0.035	0.010
Zn	0.1	<0.005	<0.005	<0.005	<0.005
P	1	0.07	0.03	0.02	0.01
NO ₃ (as N)	10	0.31	0.02	0.18	0.02
Hg	0.005	0.0118	c	0.0012	0.0019
Phenols	0.1	0.001	0.001	<0.001	<0.001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL
CENTRAL FILES NUMBER

74-7-24

DATE: July 23, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Henwin 16/24/95
Technical Information Officer
ORNL Site Date

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RADIOACTIVE EFFLUENTS
Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of May, 1974, was 0.48% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.40% MPC_W, 0.05% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The strontium at Station 3 is still higher than normal and part of this is due to the high discharge from the Process Waste System as noted below.

Process Waste

A total of 3.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The Process Waste Treatment Plant is scheduled for a shutdown the first week of June to clean out the heavy accumulation of precipitate in the outlet end of the plant. This has resulted in an overall strontium removal of 50-60% as compared to a normal efficiency of 75-85%.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 207 gph.

	<u>Gallons</u>
Total volume generated	151,000
Volume transferred to evaporator	154,000
Tank Farm free space at beginning of month	421,000
Tank Farm free space at end of month	414,000

Intermediate Level Waste (Continued)

	<u>Gallons</u>
Evaporator concentrate returned to tank farm	10,000
Volume of concentrate available for hydrofracture (South Tank Farm)	189,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	24,700
Fission Products Development Laboratory	12,000
ORR and BSR	25,200
High Flux Isotope Reactor	19,500
Radioisotopes Processing Area	12,700
4500 Complex	5,800
Transuranium Processing Area	1,600

GASEOUS WASTE

The ORNL stacks discharged 90 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 96 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.8% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards twenty-two times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

NONROUTINE MAINTENANCE

The following items of nonroutine maintenance were performed during the month:

1. Two sets of sleeve bearings were replaced on the 3025-3026 cell ventilation blower.
2. The main switch at Station 2301-4 (feeder to the 3039 stack area) was pulled and reworked. A ground fault was also cleared at this station.

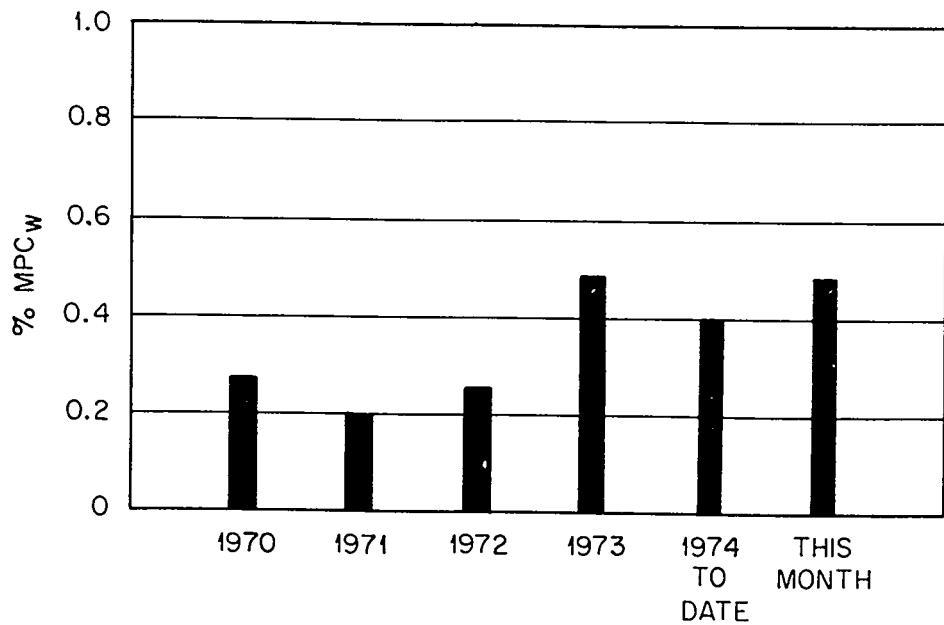


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

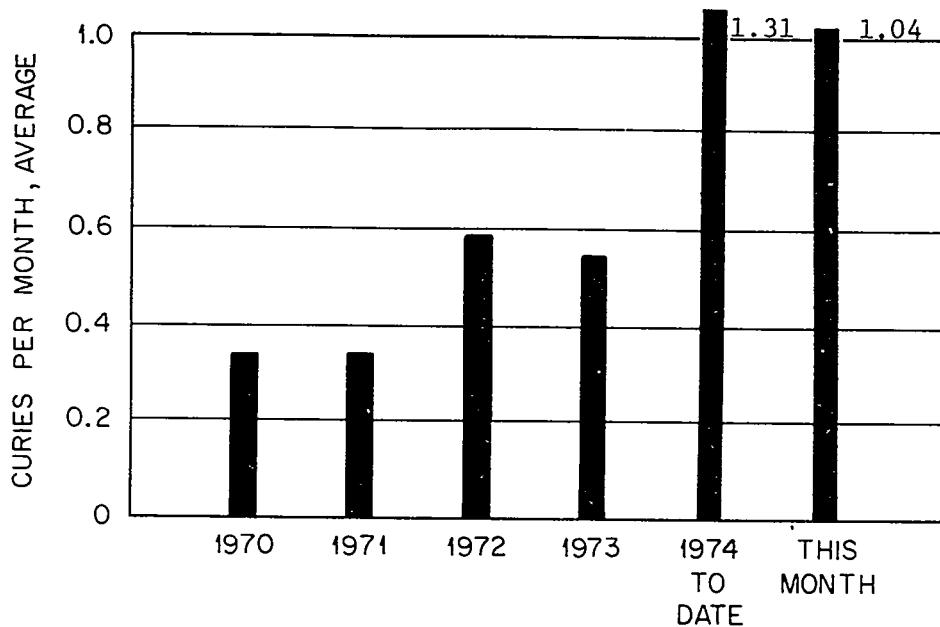


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

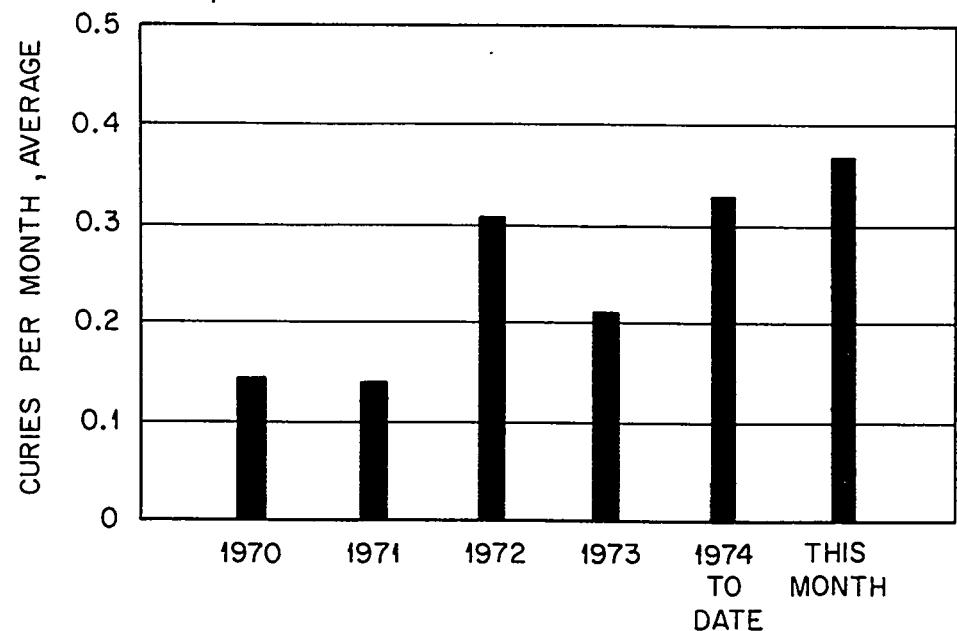


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

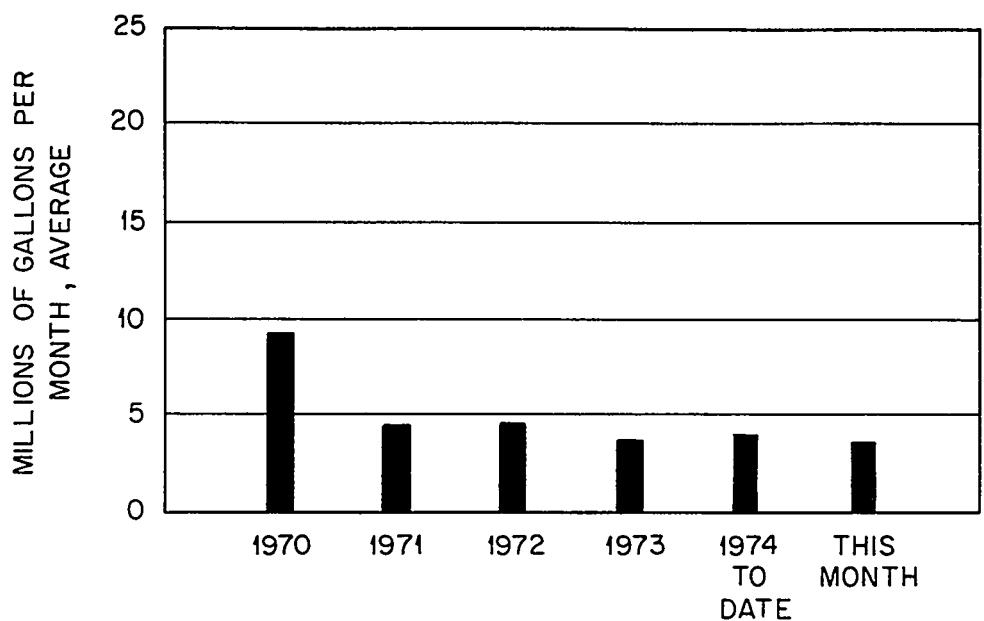


Fig 4. Process Waste Volumes.

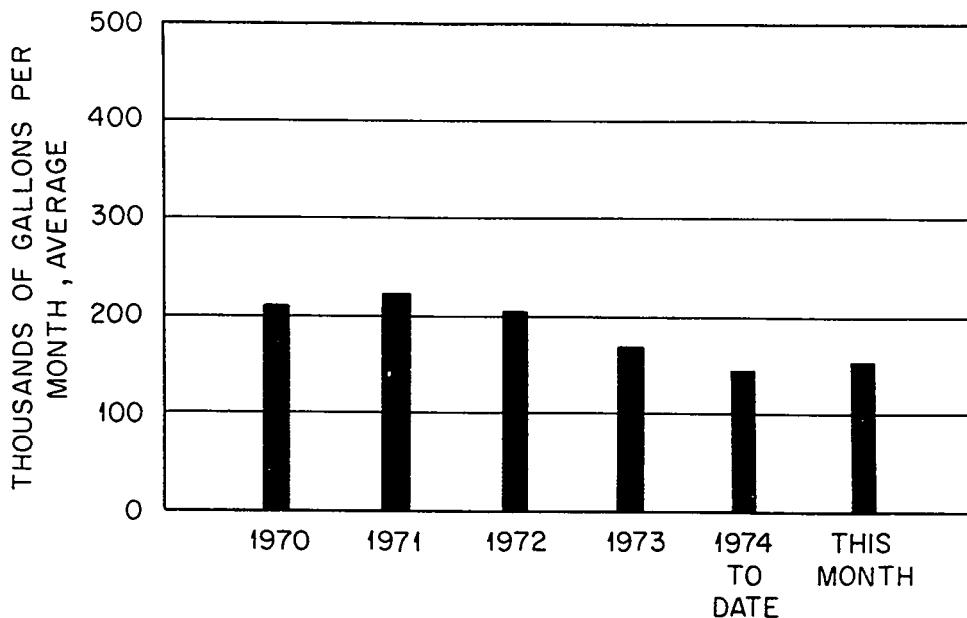


Fig 5. Intermediate - Level Waste Volumes.

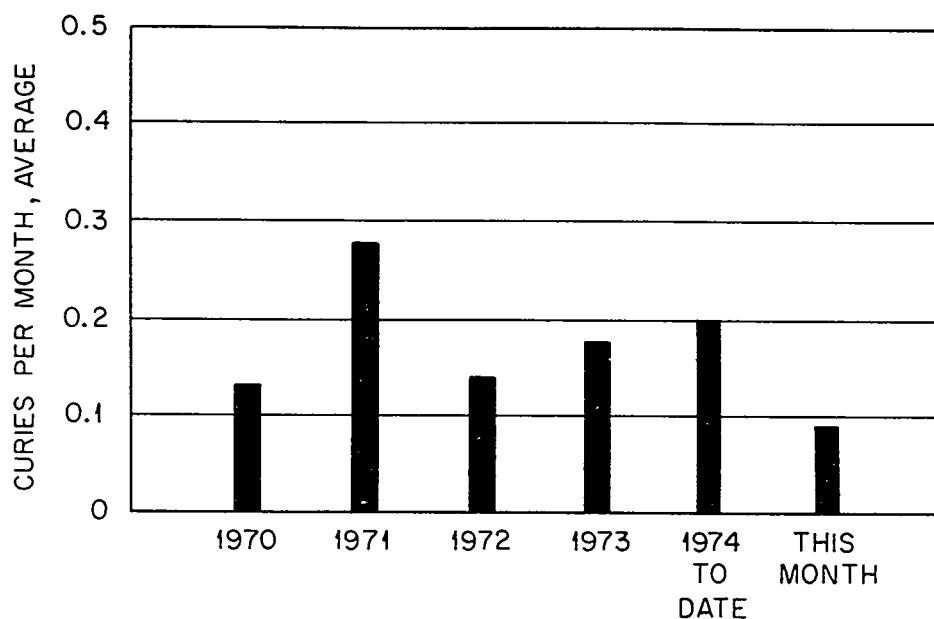


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

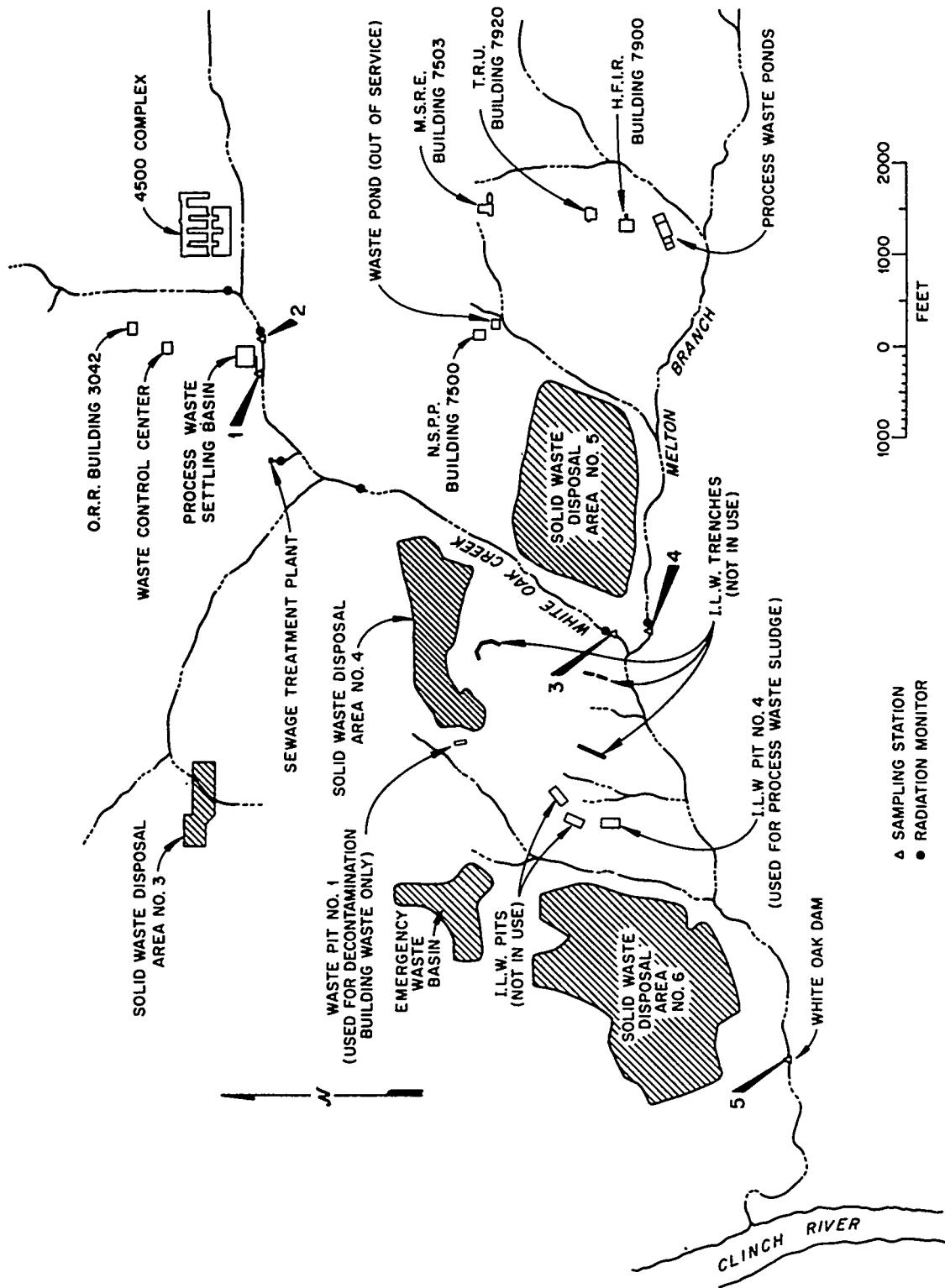


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste			
Miscellaneous discharges from east enc of plant	1	0.37	0.86
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.12	0.33
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.90	1.40
Total discharge from all sources	4	0.14	0.17
White Oak Dam to Clinch River (Health Physics measurement)	3,4 5	1.04 0.58	1.57 0.80

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ /mla	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Curies ^b	% of Total	Curies	% of Total		
1. Radioisotopes Processing Area (MH234)	83.5	0.04	8.3	0.08	2.4		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.21 ^c	43.8	0.41	12.5		
3. Reactor Operations (MH112)	3.4	<0.01	-	0.37	11.3		
4. Buildings 3503 and 3508	4.1	<0.01	-	0.19	5.8		
5. Buildings 3025 and 3026	3.3	<0.01	-	0.21	6.4		
6. Building 3019	3.7	<0.01	-	0.16	4.9		
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3		
8. Waste Evaporator, Bldg. 2531	9.1	0.02	4.1	0.37	11.3		
9. Building 3525	0.1	<0.01	-	0.02	0.6		
10. Building 2026	≤ 0.3	<0.01	-	0.16	4.9		
11. Tank Farm Drainage	29.0	0.21	43.8	1.30	39.6		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	-
Central Radioactive Gas Disposal Facilities	3039	0.08	80
Radiochemical-Processing Pilot Plant	3020	0	-
MSRE	7512	0	-
HFIR	7911	0.01	16
Total Activity in Gases Released at X-10 Site		0.09	96
Isotopes Division - Y-12 Area		0.4	
Tritium Target Fabrication Building	c (³ H)		

^aActivity primarily ¹³¹I except as noted.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

^cNo sample was taken this month.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in
White Oak Creek, Melton Branch, and at White Oak Dam
May, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3 4 5	< 4.5 6.8 6.5	> 9.5 7.9 8.5	22 ^d None None	19.8 - -
Dissolved Oxygen	5 ppm min.	3 4 5	2.2 5.0 5.7	10.9 11.5 >15.0	12 None None	79.7 - -
Temp.	<30°C < 2°C/hr change	3 4 5	13.7 11.2 9.1	24.7 22.5 29.2	None None None	- - -

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dTwenty-two excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 18 excursions, and the Building 3004 demineralizer was responsible for 4 excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
May, 1974

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.050	0.220	0.060	<0.005
Zn	0.1	0.014	0.012	<0.005	0.013
P	1	0.10	0.01	0.08	0.05
NO ₃ (as N)	10	0.70	0.19	0.60	0.13
Hg	0.005	0.0006	c	0.0001	<0.0001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

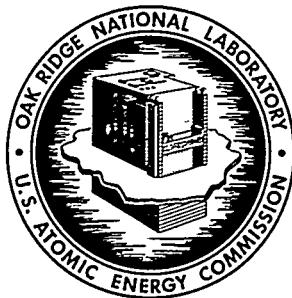
Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL

CENTRAL FILES NUMBER

74-8-13

DATE: August 14, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Daniel Hanin 10/24/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1974, was 0.35% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.30% MPC_W, 0.04% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

As can be noted in Table 1 and Figure 2, the ⁹⁰Sr discharge into White Oak Lake is near the average monthly discharge experienced the past two years. The discharge from Burial Ground No. 4 has decreased considerably from a high of one Ci/mo during rainy periods to about 0.2 Ci/mo, which is about the average monthly discharge for the past three years.

Process Waste

A total of 4.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The sludge accumulation was removed from the Waste Treatment Plant basins this month, and this should result in an increased efficiency in plant operation.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 176 gph.

	<u>Gallons</u>
Total volume generated	143,000
Volume transferred to evaporator	127,000
Tank Farm free space at beginning of month	414,000

	<u>Gallons</u>
Tank Farm free space at end of month	394,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture (South Tank Farm)	153,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	16,200
Fission Products Development Laboratory	30,000
ORR and BSR	34,600
High Flux Isotope Reactor	24,700
Radioisotopes Processing Area	7,200
4500 Complex	6,100
Transuranium Processing Area	3,300

GASEOUS WASTE

The ORNL stacks discharged 70 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 218 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.6% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The ^3H discharge from the Tritium Target Fabrication Building (Building 7025) is also shown in Table 3.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown

in Table 4. The pH of White Oak Creek was out of compliance with the standards twenty times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

NONROUTINE MAINTENANCE

A burned-out starter coil was replaced on the Isotope blower in the 3039 Stack Area.

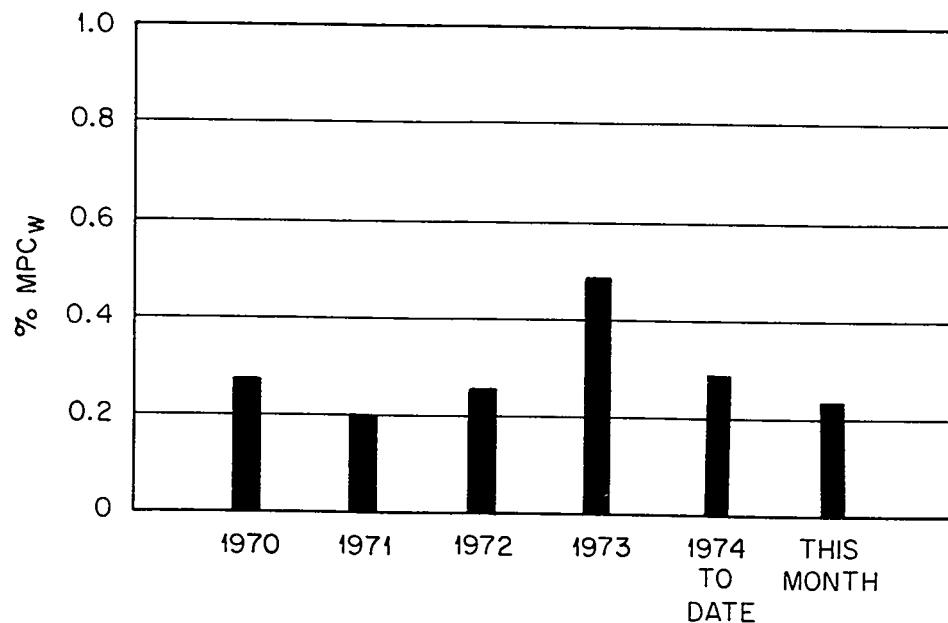


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

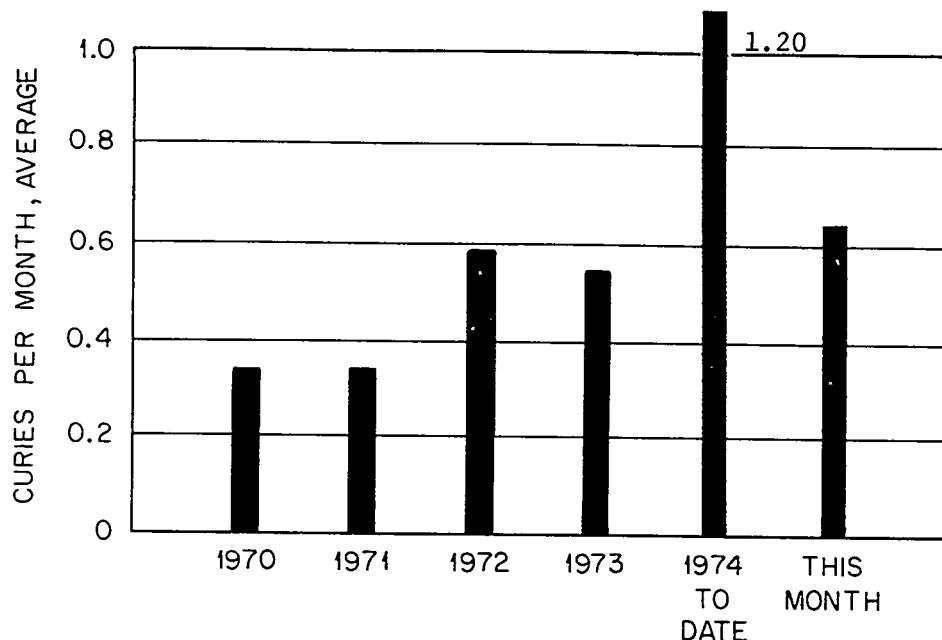


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

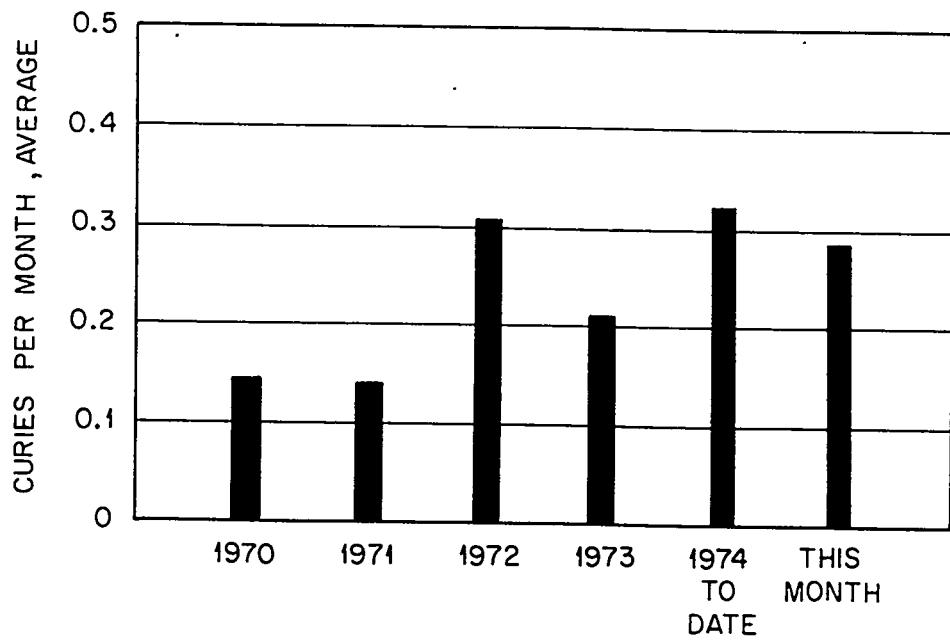


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

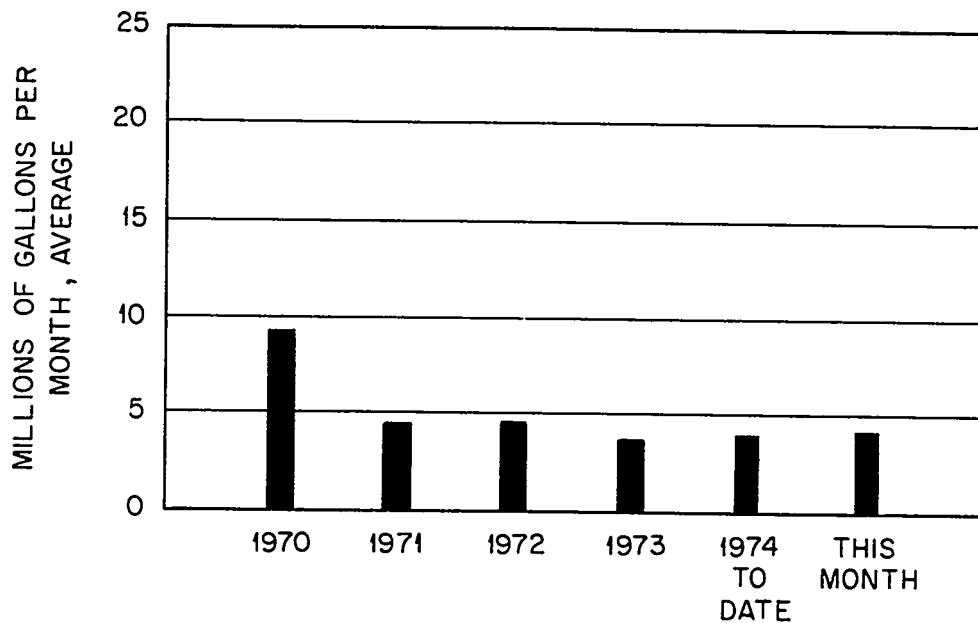


Fig 4. Process Waste Volumes.

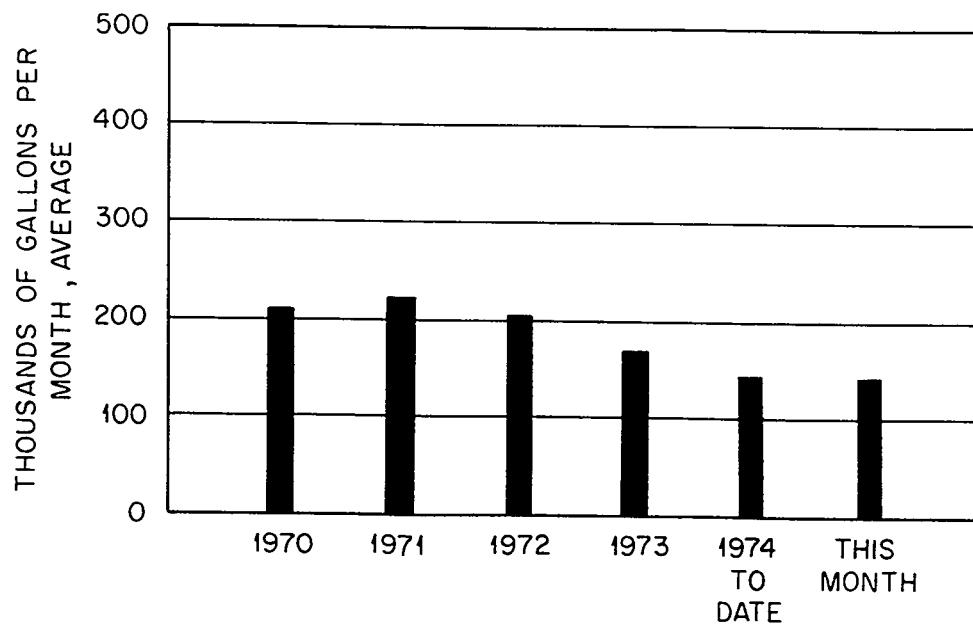


Fig 5. Intermediate - Level Waste Volumes.

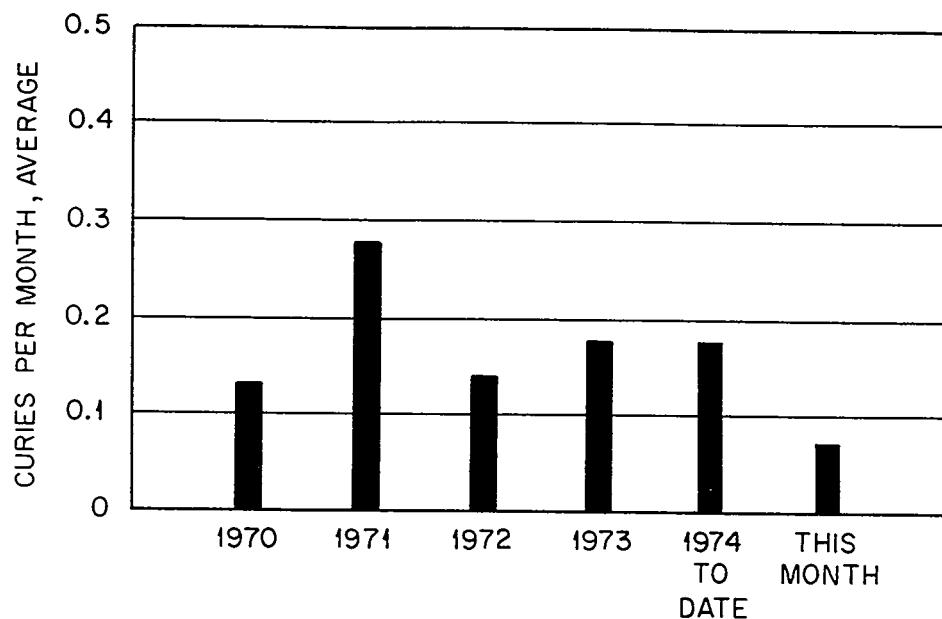


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

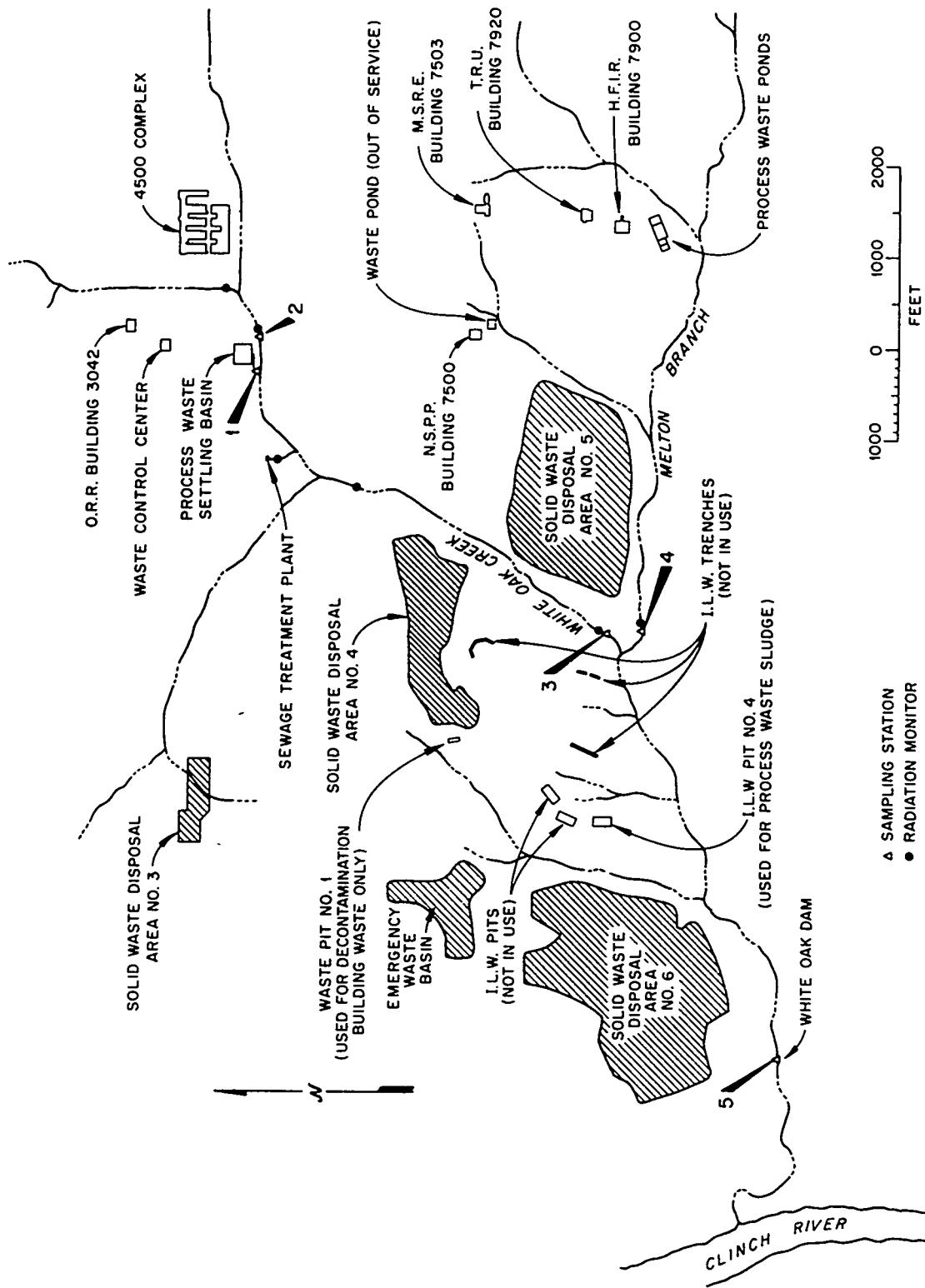


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.29	0.67
Miscellaneous discharges from east end of plant	2	0.07	0.38
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.56	0.88
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.12
Total discharge from all sources	3,4	0.64	1.00
White Oak Dam to Clinch River (Health Physics measurement)	5	0.31	0.43

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/mla	Gross-Beta		Volume	
		Curies ^b	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	118	0.03	6.5	0.05	1.7
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.22 ^c	47.8	0.43	14.2
3. Reactor Operations (MH112)	1.1	<0.01	-	0.37	12.2
4. Buildings 3503 and 3508	≤ 2.7	<0.01	-	0.24	7.9
5. Buildings 3025 and 3026	2.9	<0.01	-	0.18	5.9
6. Building 3019	2.2	<0.01	-	0.37	12.2
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3
8. Waste Evaporator, Bldg. 2531	17.0	0.03	6.5	0.27	8.9
9. Building 3525	≤ 0.1	<0.01	-	0.02	0.7
10. Building 2026	0.3	<0.01	-	0.19	6.3
11. Tank Farm Drainage	35.5	0.18	39.2	0.90	29.7

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a		Filterable Particulate Activity ^b (Microcuries)
		Stack	No.	
HRLAL	2026	0		-
Central Radioactive Gas Disposal Facilities	3039	0.06		197
Radiochemical-Processing Pilot Plant	3020	0		2
MSRE	7512	0		-
HFIR	7911	0.01		19
Total Activity in Gases Released at X-10 Site		0.07		218
Isotopes Division - Y-12 Area				0.4
Tritium Target Fabrication Building		1.7 (³ H)		

^a Activity primarily ¹³¹I except as noted.^b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam June, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH <1 pH unit/day change	6.5-8.5	3	< 4.5	9.2	20 ^d	24.1
		4	7.1	9.1	1 ^e	8.4
		5	6.6	8.3	None	-
Dissolved Oxygen 5 ppm Min.		3	< 1.0	10.2	16	252
		4	5.0	8.6	None	-
		5	7.0	>15.0	None	-
Temp. < 2°C/hr change	<30°C	3	16.2	25.5	None	-
		4	14.2	22.7	None	-
		5	17.0	29.5	None	-

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dTwenty excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 19 excursions, and the Building 3004 demineralizer was responsible for one excursion. In most cases, these excursions resulted in pH changes greater than one unit change per day.

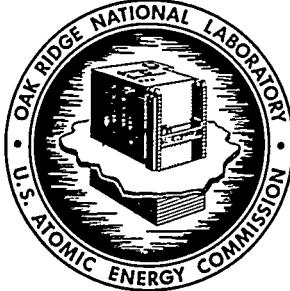
^eOne excursion outside the 6.5-8.5 standard occurred while draining a TRU pond. This resulted in a pH change greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
June, 1974

Contaminant	Standard ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.070	0.230	0.030	<0.005
Zn	0.1	0.042	0.020	0.008	<0.005
P	1	0.11	0.02	0.03	0.01
NO ₃ (as N)	10	0.80	0.98	0.36	0.02
Hg	0.005	0.0006	c	0.0002	0.0012

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL

CENTRAL FILES NUMBER

74-9-31

DATE: September 24, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release
to the public by:

David R. Horan 10/9/95
Technical Information Officer Date
ORNL File

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of July, 1974, was 0.21% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I, were 0.19% MPC_W, 0.01% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.2 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 191 gph.

	<u>Gallons</u>
Total volume generated	147,000
Volume transferred to evaporator	142,000
Tank Farm free space at beginning of month	394,000
Tank Farm free space at end of month	383,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	158,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	11,300
Fission Products Development Laboratory	41,400
ORR and BSR	22,700
High Flux Isotope Reactor	24,800
Radioisotopes Processing Area	5,700
4500 Complex	2,600
Transuranium Processing Area	4,700

GASEOUS WASTE

The ORNL stacks discharged 210 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 239 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.2% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards twelve times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

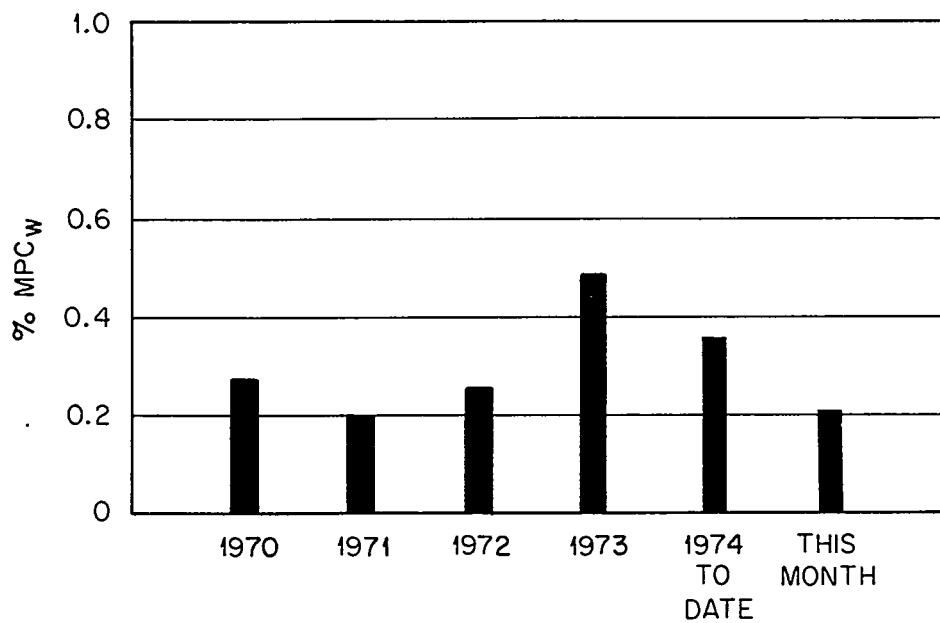


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

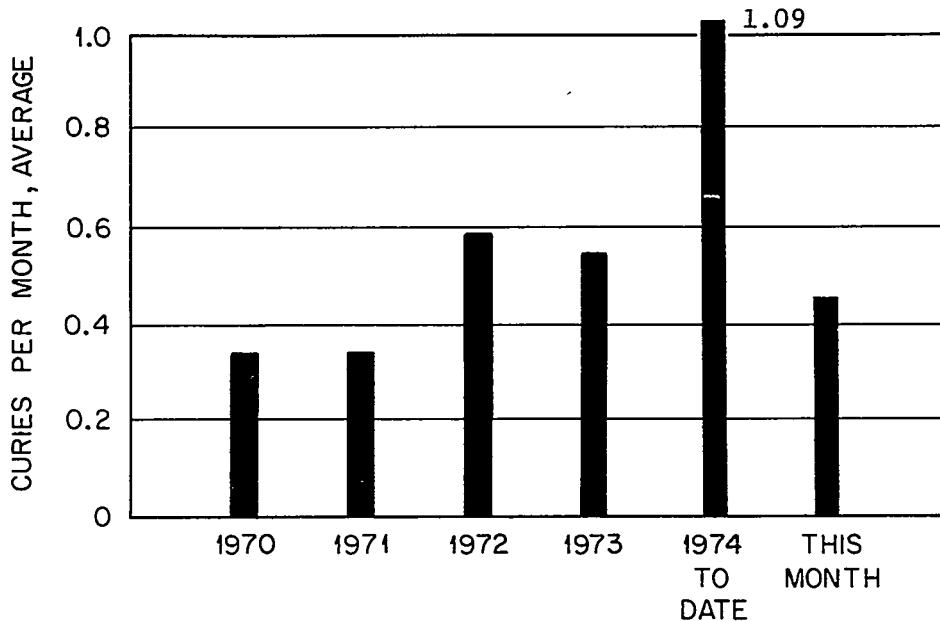


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

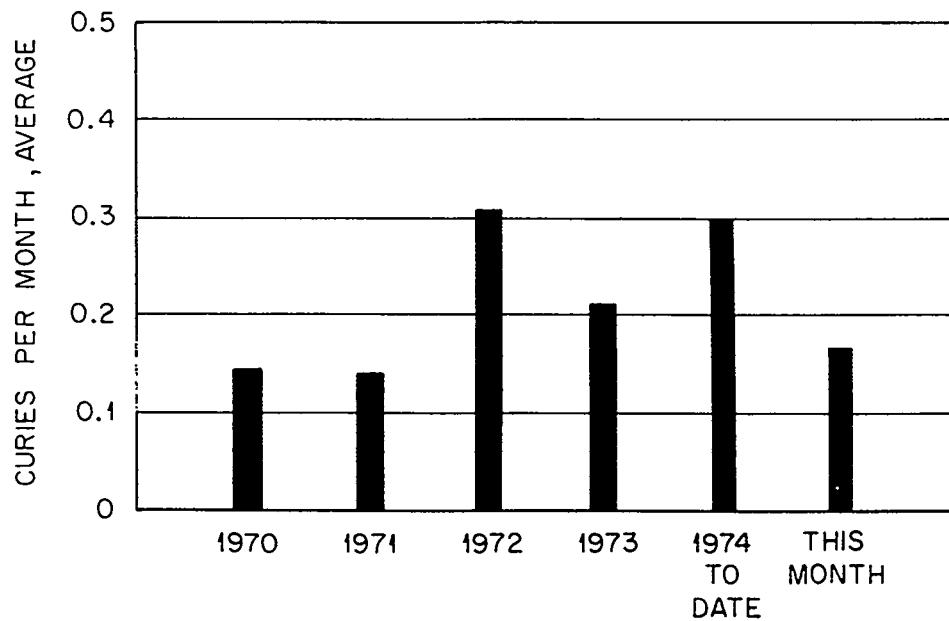


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

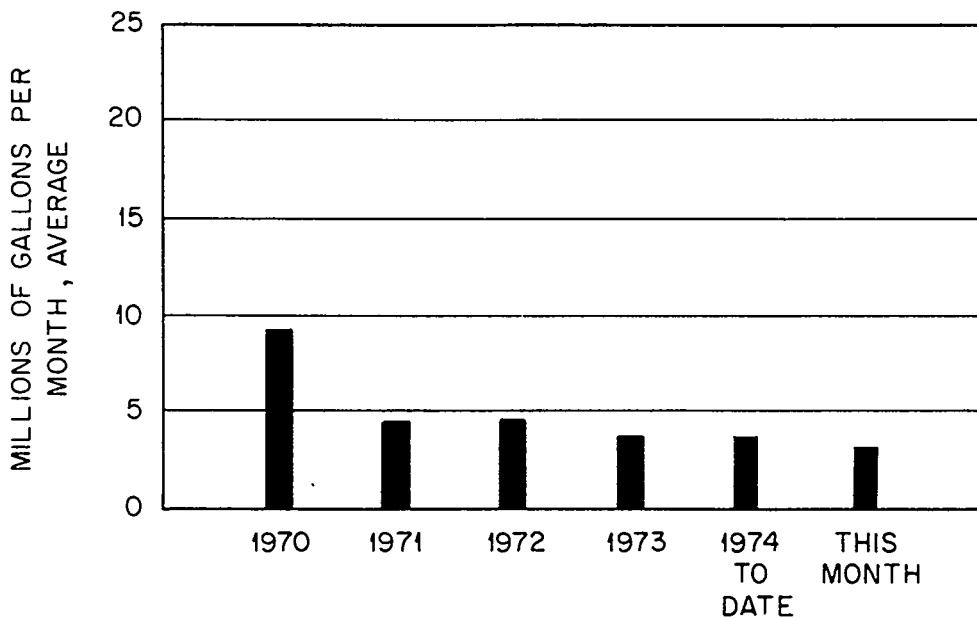


Fig 4. Process Waste Volumes.

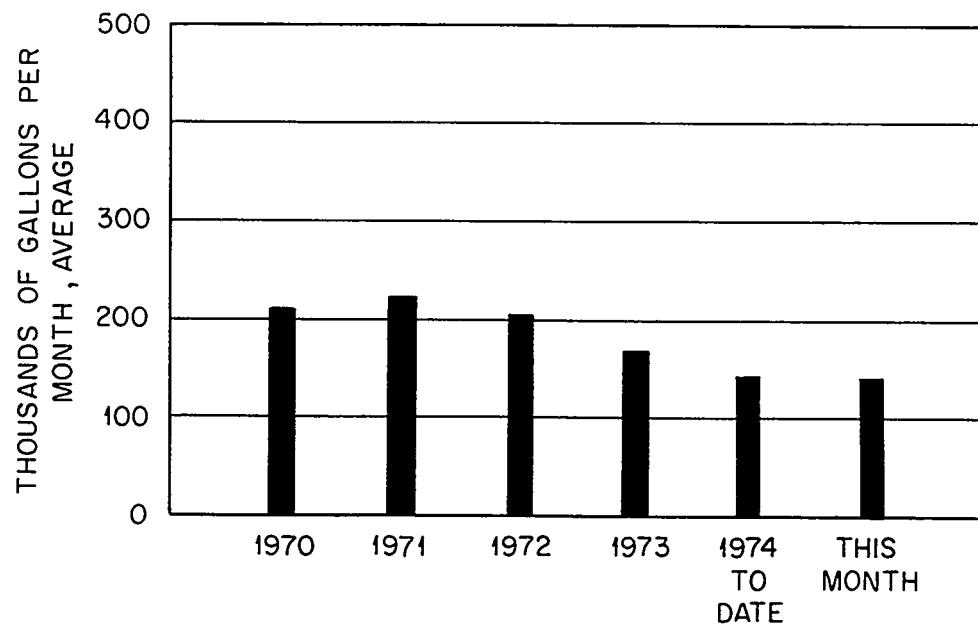


Fig 5. Intermediate - Level Waste Volumes.

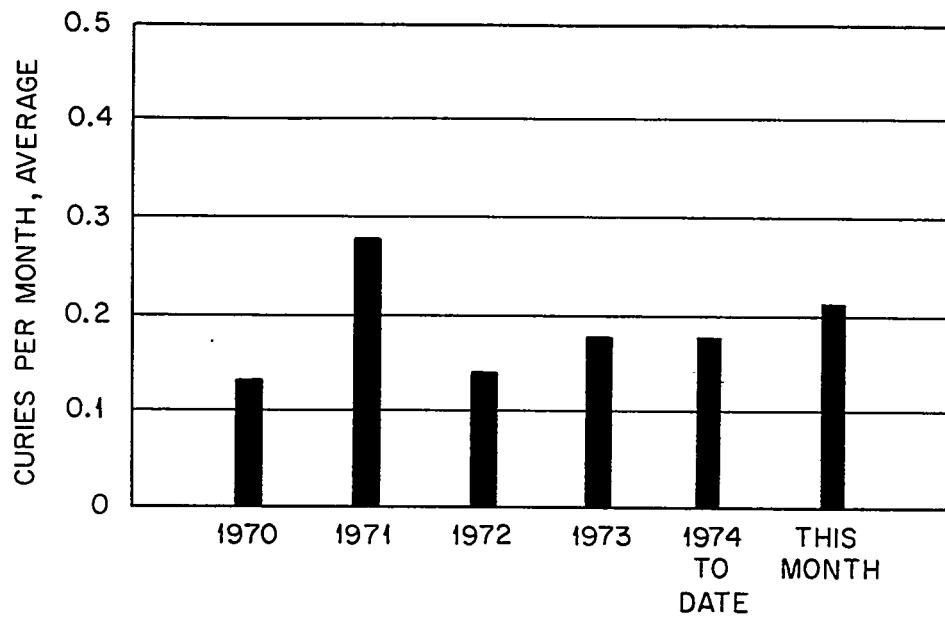


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

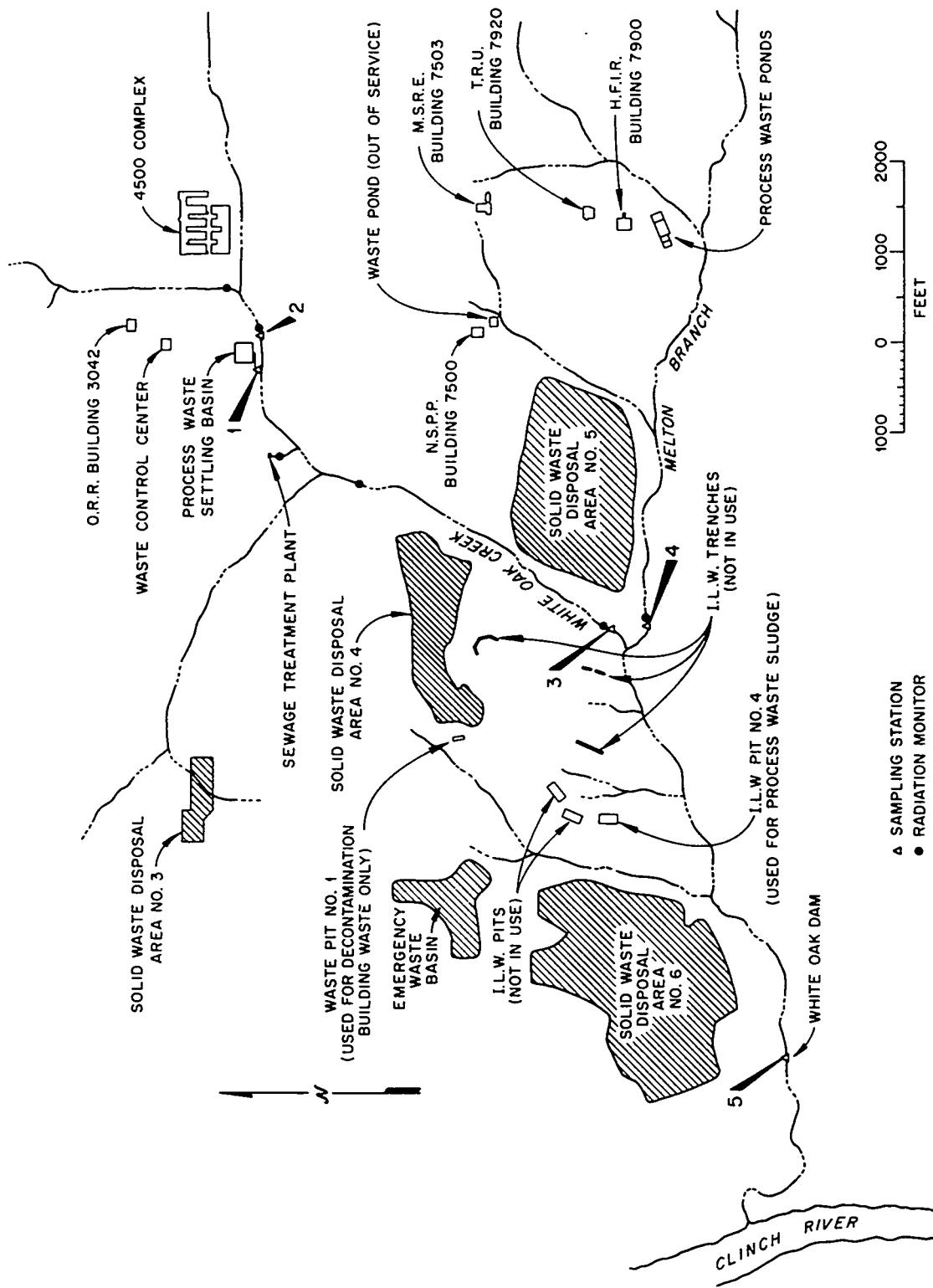


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies ^a	Gross Beta, Curies ^b
Process Waste	1	0.17	0.48
Miscellaneous discharges from east end of plant	2	0.03	0.19
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.42	0.91
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.04	0.06
Total discharge from all sources	3,4	0.46	0.97
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.30

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ ^a	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Total	% of Total	Total	% of Total		
1. Radioisotopes Processing Area (MH234)	65.2	0.03	5.9	0.09	2.8		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.25 ^c	49.0	0.37	11.5		
3. Reactor Operations (MH112)	1.8	<0.01	-	0.35	10.9		
4. Buildings 3503 and 3508	< 1.9	<0.01	-	0.23	7.2		
5. Buildings 3025 and 3026	3.6	<0.01	-	0.21	6.6		
6. Building 3019	3.3	<0.01	-	0.43	13.4 ¹⁰		
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3		
8. Waste Evaporator, Bldg. 2531	17.4	0.05	9.8	0.47	14.6		
9. Building 3525	< 0.2	<0.01	-	0.03	0.9		
10. Building 2026	< 0.3	<0.01	-	0.21	6.6		
11. Tank Farm Drainage	3.9	0.18	35.3	0.81	25.2		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Filterable Activity ^a (Curies)		Particulate Activity ^b (Microcuries)
		Stack No.	Activity ^a (Curies)	
HRLAL	2026	0	0	1
Central Radioactive Gas Disposal Facilities	3039	0.20	219	
Radiochemical-Processing Pilot Plant	3020	0	2	
MSRE	7512	0	0	
HFIR	7911	0.01	17	
Total Activity in Gases Released at X-10 Site		0.21	239	
Isotopes Division - Y-12 Area			0.4	
Tritium Target Fabrication Building		1.6 (³ H)		

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam July, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH <1 pH unit/day change	6.5-8.5	3	5.7	9.2	12	27.5 ^d
		4	7.1	8.5	None	-
		5	7.0	8.5	None	-
Dissolved Oxygen	5 ppm Min.	3	<1.0	8.2	21	322
		4	5.0	10.2	None	-
		5	5.0	>15.0	None	-
Temp. < 2°C/hr change	<30°C	3	18.7	26.7	None	-
		4	15.4	25.5	None	-
		5	24.0	>30.0	16	e

a These measurements are continuous and are recorded.

b These are Tennessee Water Quality Criteria standards.

c Refer to Figure 7.

d Twelve excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 10 excursions, the Building 3004 demineralizer was responsible for 1 excursion and 1 was from an unknown source. In most cases, these excursions resulted in pH changes greater than one unit change per day.

e These excursions were due to weather conditions.

Table 5. Concentration of Nonradioactive Effluents
July, 1974

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.050	0.320	<0.005	<0.005
Zn	0.1	0.020	<0.005	<0.005	<0.005
P	1	0.21	0.02	0.07	0.02
NO ₃ (as N)	10	0.19	2.35	0.44	0.39
Hg	0.005	0.0009	c	<0.0001	<0.0001

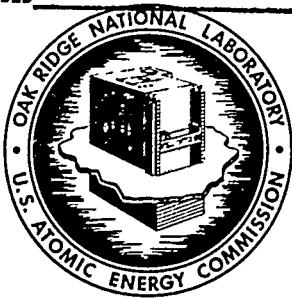
- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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CENTRAL FILES NUMBER

74-12-30

DATE: December 20, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Henkin 16 Dec 95

 Technical Information Officer Date
 ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of October, 1974, was 0.18% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.15% MPC_W and 0.02% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 2.6 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 142 gph.

	<u>Gallons</u>
Total volume generated	103,000
Volume transferred to evaporator	106,000
Tank Farm free space at beginning of month	473,000
Tank Farm free space at end of month	470,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	95,000
Volume of concentrate at hydrofracture site	82,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	18,000
Fission Products Development Laboratory	23,300
ORR and BSR	18,200
High Flux Isotope Reactor	14,000
Radioisotopes Processing Area	5,600
4500 Complex	3,700
Transuranium Processing Area	2,900

GASEOUS WASTE

The ORNL stacks discharged 120 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 495 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.8% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-two times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

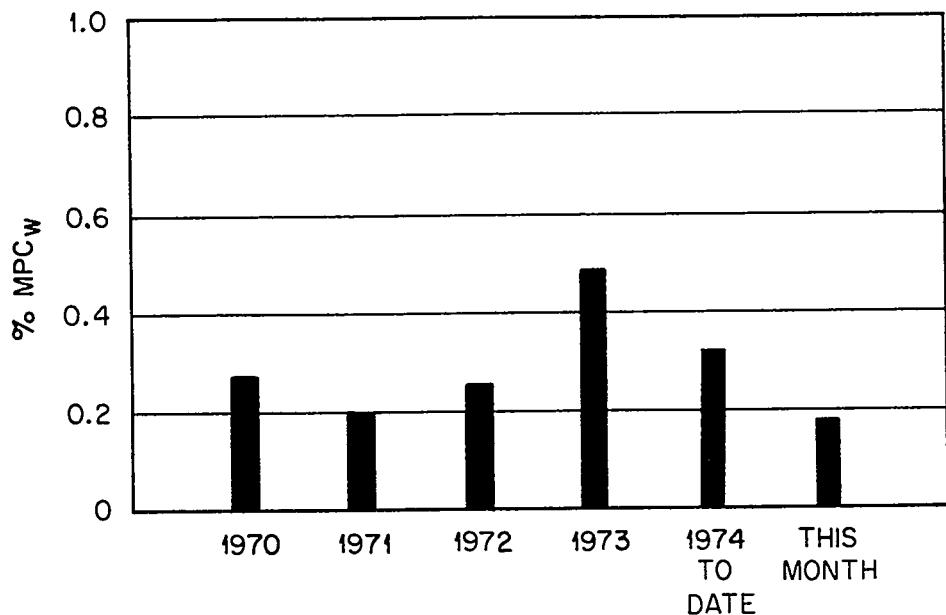


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

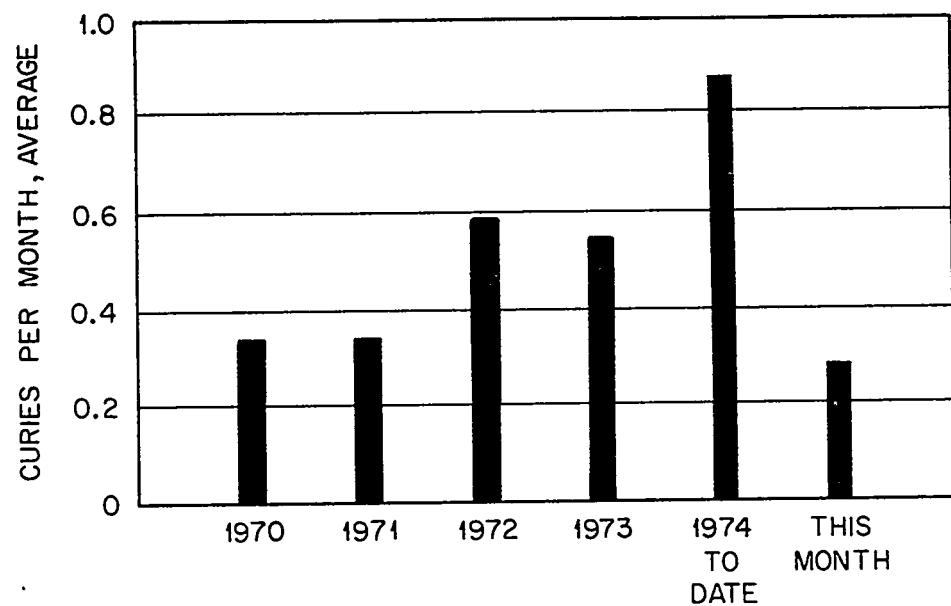


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

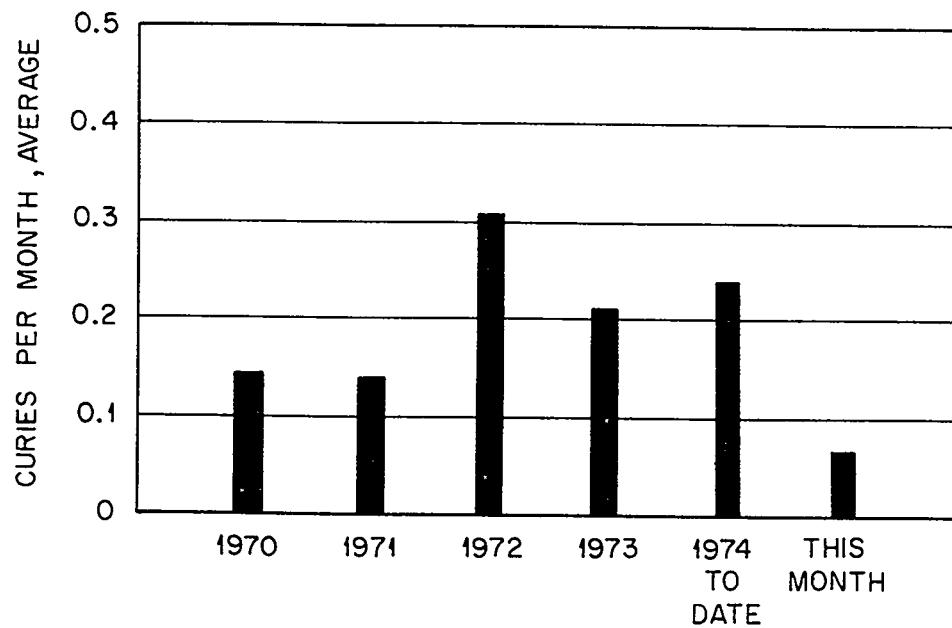


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

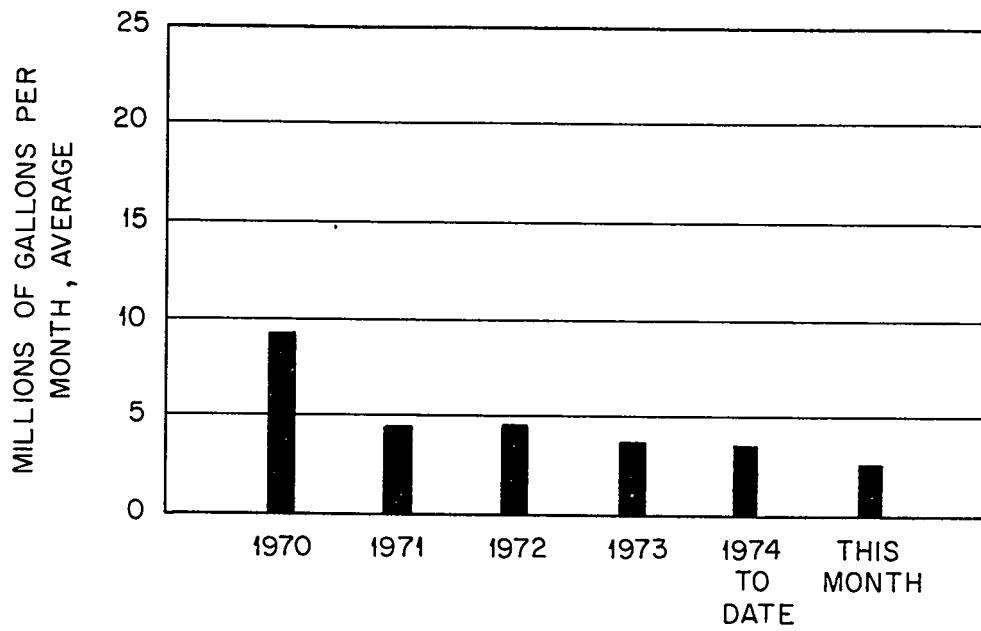


Fig 4. Process Waste Volumes.

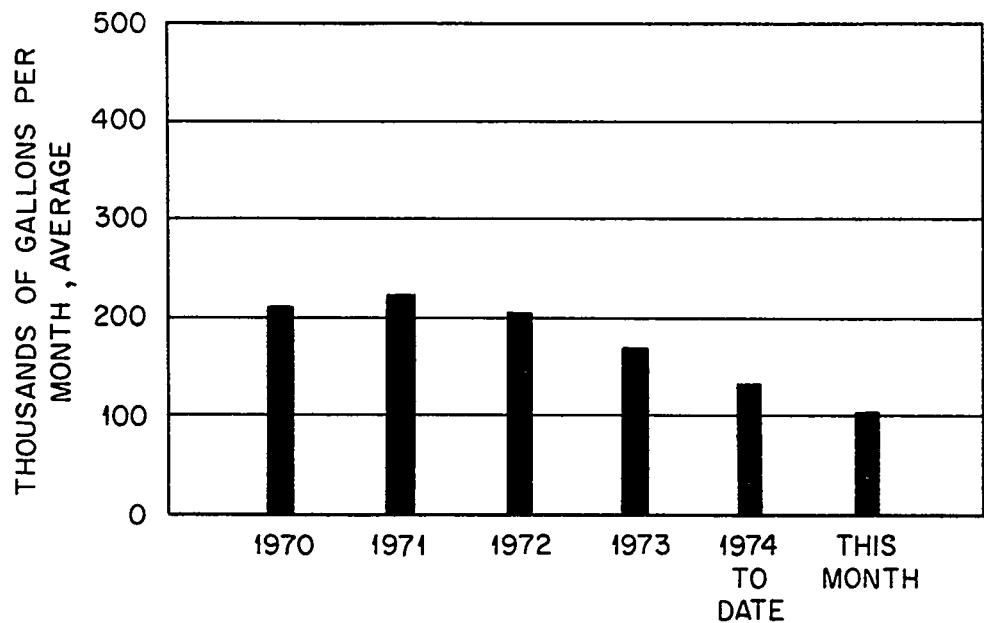


Fig 5. Intermediate - Level Waste Volumes.

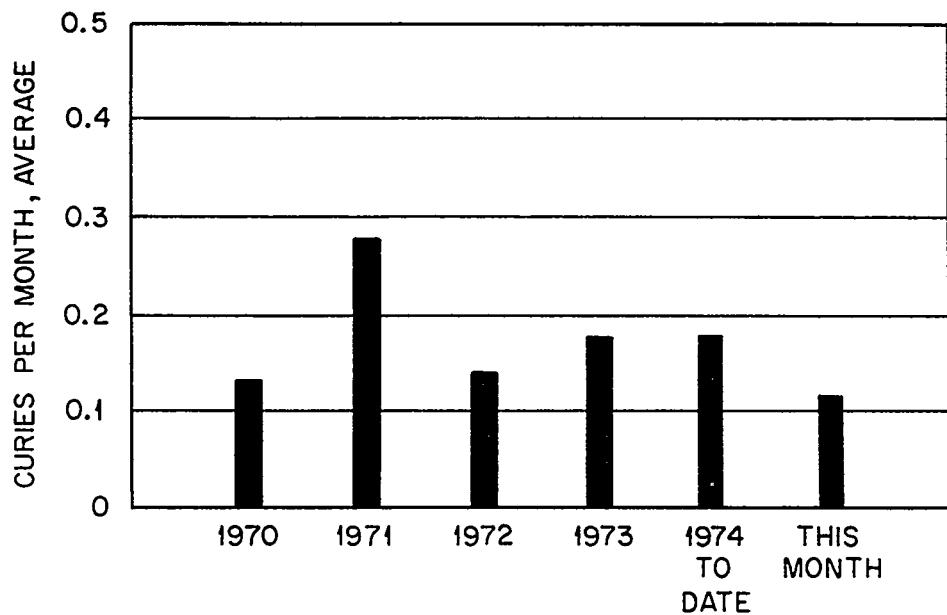


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

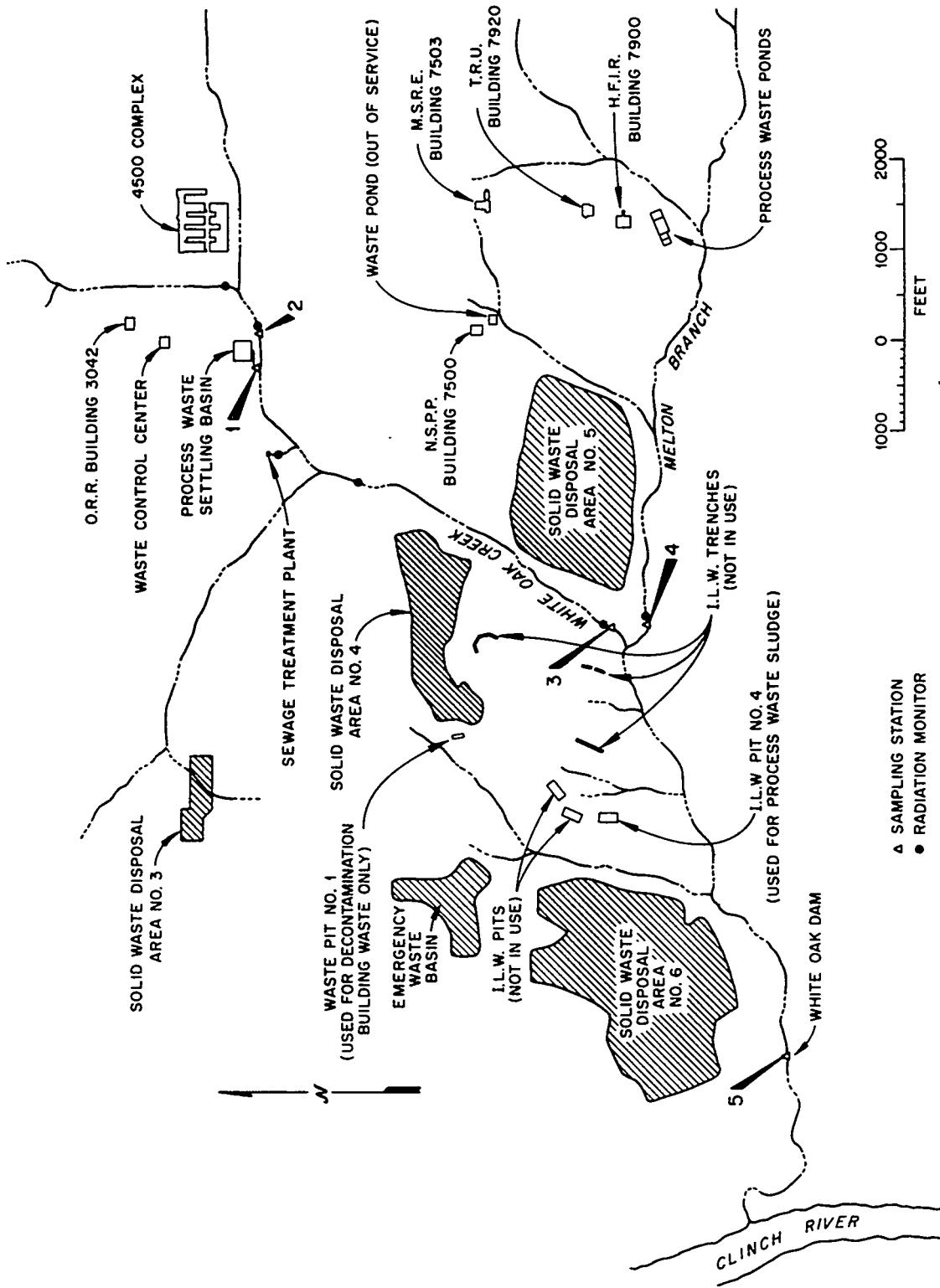


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.07	0.16
Miscellaneous discharges from east end of plant	2	0.01	0.25
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.27	0.55
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.03
Total discharge from all sources	3,4	0.29	0.58
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.23

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ ^a	Gross-Beta		Gross-Beta		Million Gallons	% of Total
		Curies ^b	% of Total	Curies	% of Total		
1. Radioisotopes Processing Area (MH234)	126.0	0.04	10.2	0.05	1.5		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.17 ^c	43.6	0.27	8.5		
3. Reactor Operations (MH112)	0.8	<0.01	-	0.47	14.8		
4. Buildings 3503 and 3508	< 1.3	<0.01	-	0.32	10.1		
5. Buildings 3025 and 3026	2.7	<0.01	-	0.19	6.0		
6. Building 3019	4.5	0.01	2.6	0.53	16.7		
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3		
8. Waste Evaporator, Bldg. 2531	9.2	0.03	7.7	0.55	17.3		
9. Building 3525	< 0.1	<0.01	-	0.03	0.9		
10. Building 2026	< 0.6	<0.01	-	0.14	4.4		
11. Tank Farm Drainage	40.3	0.14	35.9	0.62	19.5		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)	
			11	11
HRLAL	2026	0	0	0
Central Radioactive Gas Disposal Facilities	3039	0.11	479	
Radiochemical-Processing Pilot Plant	3020	0	2	
MSRE	7512	0	0	0
HFIR	7911	0.01	18	
Total Activity in Gases Released at X-10 Site		0.12	495	
Isotopes Division - Y-12 Area		-	0.4	
Tritium Target Fabrication Building		11.0	(³ H)	
Building 4508 Ventilation Discharges				
Room 136				6×10^{-4}
Room 265				7×10^{-3}

^a Activity primarily ¹³¹I except as noted.^b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam October, 1974

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH change	6.5-8.5 <1 pH unit/day	3 4 5	5.5 7.1 7.2	8.7 8.5 9.3	32 None 22	69.3 - e
Dissolved Oxygen	5 ppm Min.	3 4 5	1.7 5.0 5.0	13.5 9.4 >15.0	6 None None	72 - -
Temp. change	<30 °C < 2 °C/hr	3 4 5	13.5 9.5 13.0	22.5 22.5 24.4	None None None	- - -

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dThirty-two excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 30 excursions, and the Building 3004 demineralizer was responsible for two excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

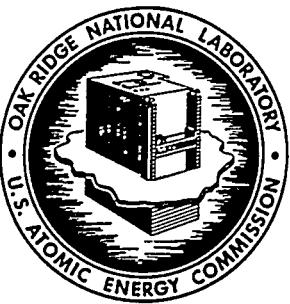
^eThe pH excursions in White Oak Lake were apparently the result of a gradual increase in the pH of the lake due to natural causes and not to Laboratory operations.

Table 5. Concentration of Nonradioactive Effluents
October, 1974

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.075	3.200	0.160	0.015
Zn	0.1	0.020	0.184	0.009	<0.005
P	1	0.37	0.67	0.25	0.08
NO ₃ (as N)	10	1.24	0.71	0.82	0.11
Hg	0.005	0.0040	c	0.0011	<0.0001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL

CENTRAL FILES NUMBER

75-1-28

DATE: January 16, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David I. Hamin 3/13/96
Technical Information Officer Date
DOE, ORNL, SOR

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies ^b	Gross Beta, Curies ^b
Process Waste	1	0.13	0.25
Miscellaneous discharges from east end of plant	2	0.07	0.36
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.46	1.05
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.04	0.16
Total discharge from all sources	3,4	0.50	1.21
White Oak Dam to Clinch River (Health Physics measurement)	5	0.32	0.45

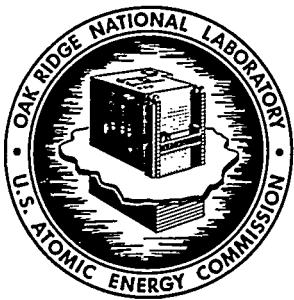
^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

DATE ISSUED FEB 18 1975

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ORNL
CENTRAL FILES NUMBER

75-2-3

DATE: February 3, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Harrin 7/10/96
Technical Information Officer
ORNL Site Date

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of December, 1974, was 0.68% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr, ³H, and ¹³¹I were 0.53% MPC_W, 0.11% MPC_W and 0.03% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The above normal rainfall for the past two months has again resulted in higher discharges of ⁹⁰Sr from the burial ground.

Process Waste

A total of 2.9 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 195 gph.

	<u>Gallons</u>
Total volume generated	149,000
Volume transferred to evaporator	145,000
Tank Farm free space at beginning of month	433,000
Tank Farm free space at end of month	412,000
Evaporator concentrate returned to tank farm	17,000
Volume of concentrate available for hydrofracture (South Tank Farm)	134,000
Volume of concentrate at hydrofracture site*	66,000

*This volume should have been 66,000 gallons and 88,000 gallons for the November and October reports, respectively. The amount transferred to the South Tank farm was 22,000 gallons instead of 25,000 gallons as reported in the November report.

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	17,400
Fission Products Development Laboratory	8,000
ORR and BSR	22,500
High Flux Isotope Reactor	24,300
Radioisotopes Processing Area	9,700
4500 Complex	5,200
Transuranium Processing Area	1,400

GASEOUS WASTE

The ORNL stacks discharged 60 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 476 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

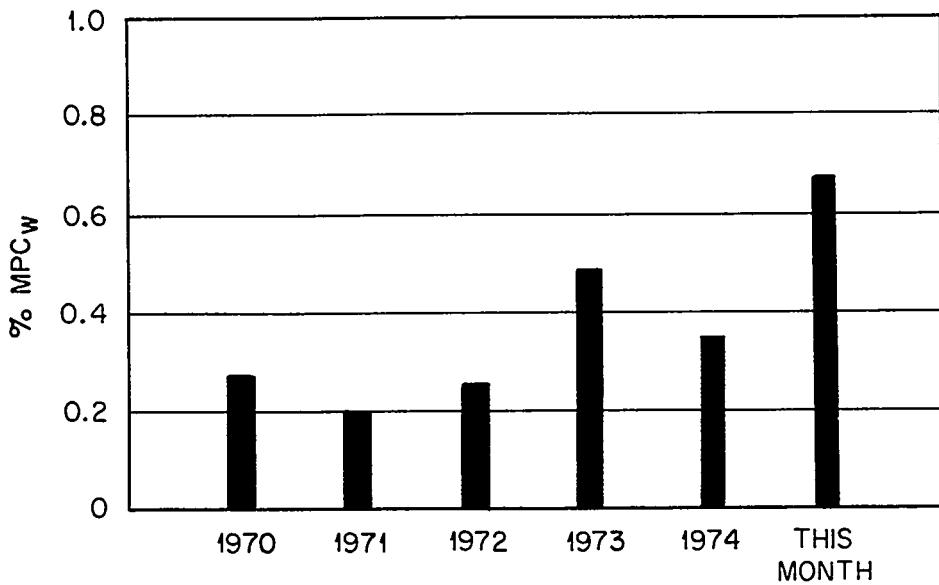


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

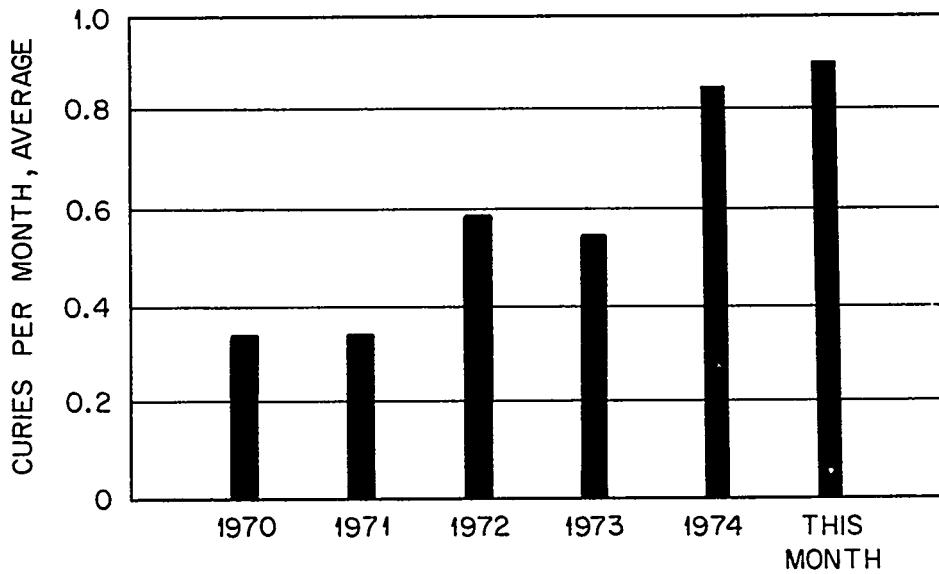


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

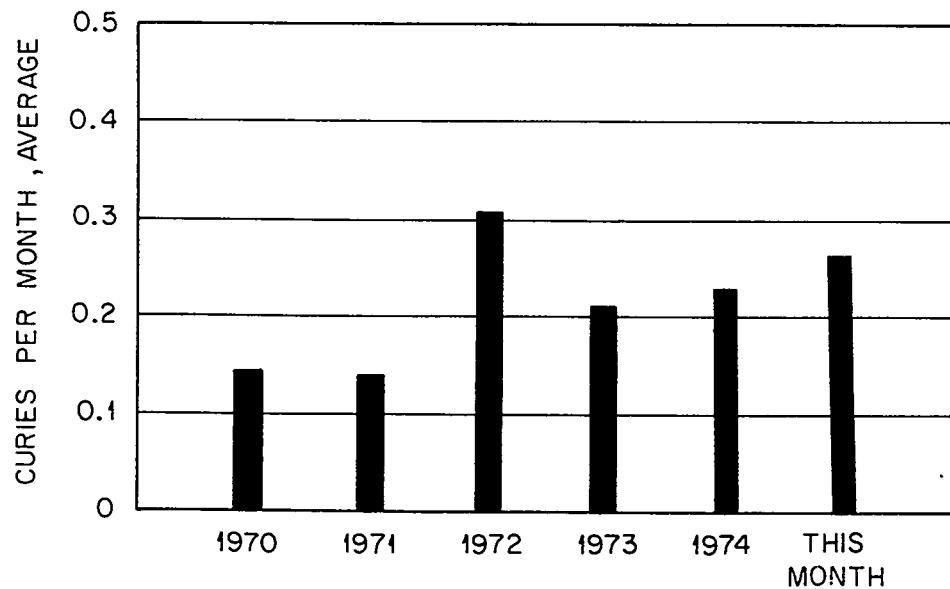


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

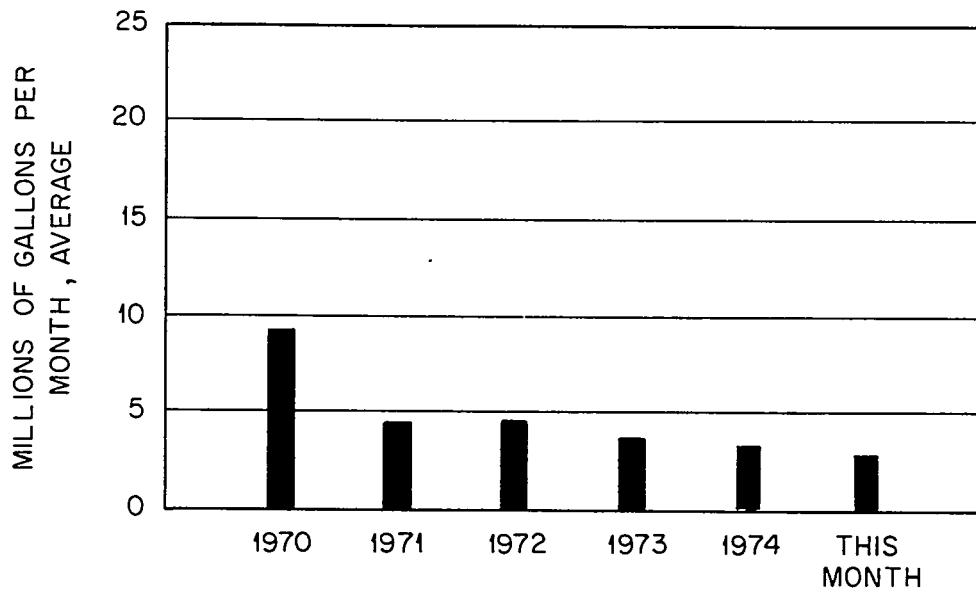


Fig 4. Process Waste Volumes.

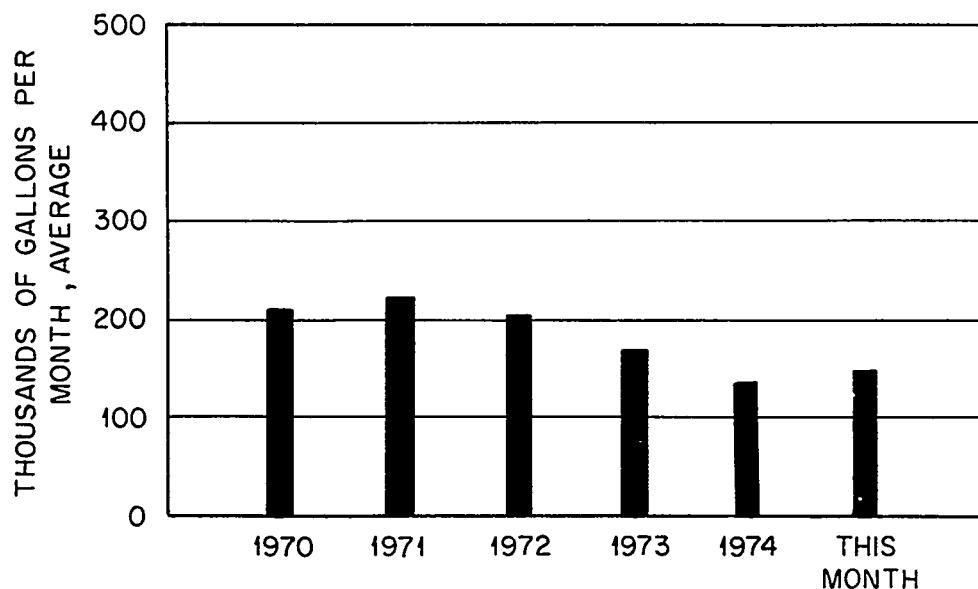


Fig 5. Intermediate - Level Waste Volumes.

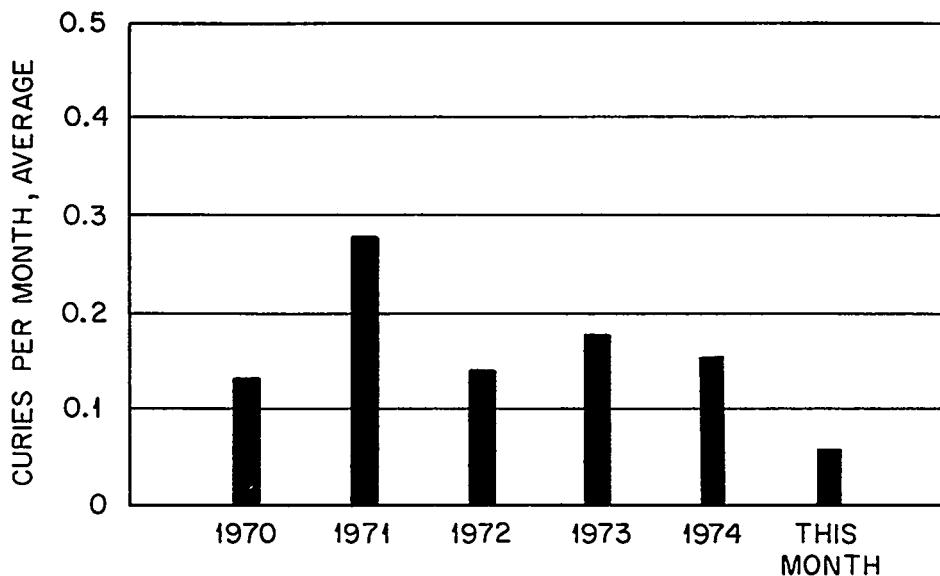


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

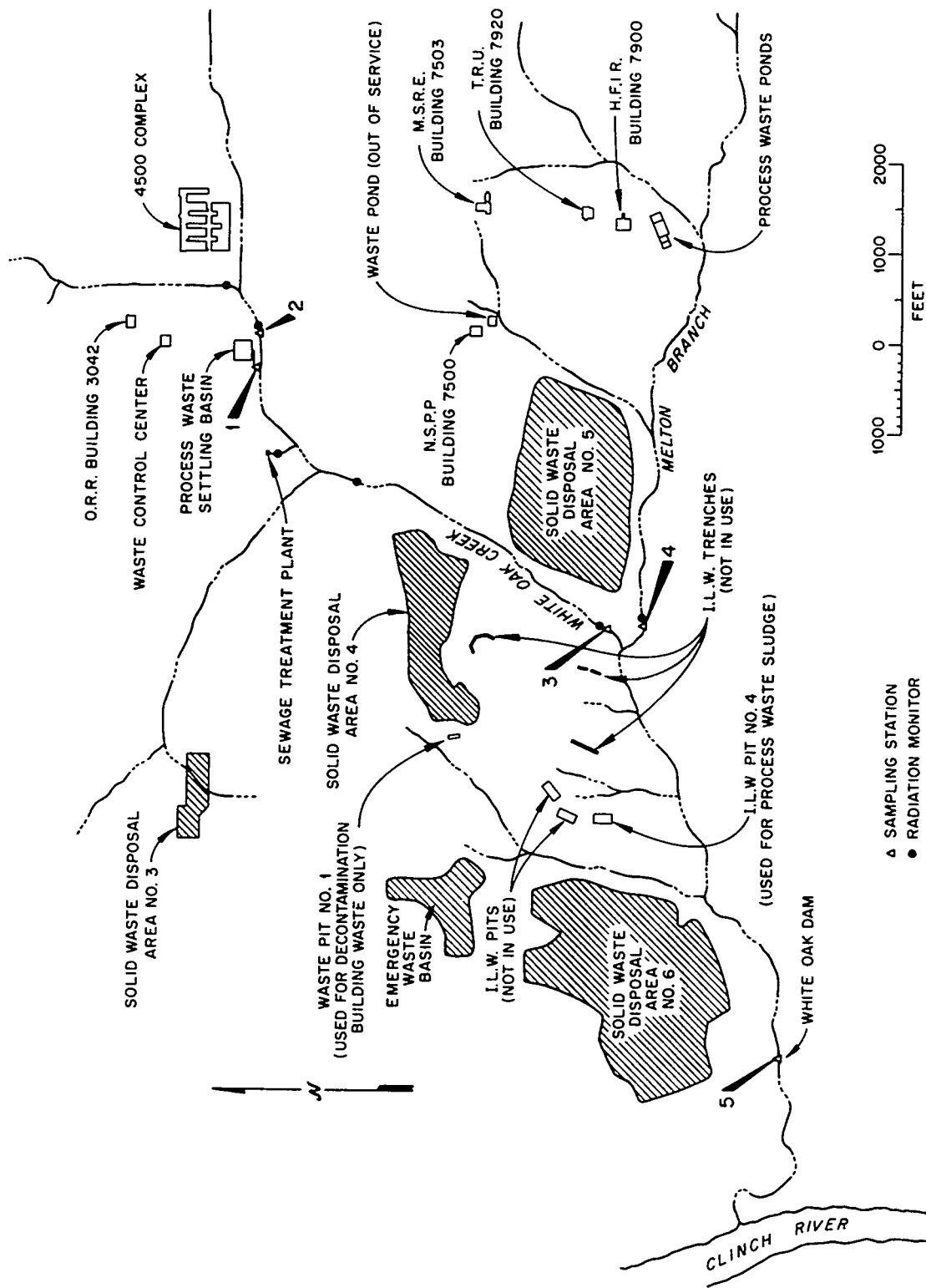


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.04	0.27
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.86	1.63
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.05	0.17
Total discharge from all sources	3,4	0.91	1.80
White Oak Dam to Clinch River (Health Physics measurement)	5	0.52	0.72

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity c/m/ml ^a	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Average	Total	Curies ^b	% of Total		
1. Radioisotopes Processing Area (MH234)	137	0.05	8.6	0.07	2.2		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.21 ^c	36.2	0.20	6.1		
3. Reactor Operations (MH112)	1.4	<0.01	-	0.87	26.7		
4. Buildings 3503 and 3508	≤ 1.0	<0.01	-	0.13	4.0		
5. Buildings 3025 and 3026	4.6	<0.01	-	0.27	8.3		
6. Building 3019	5.5	0.01	1.7	0.34	10.4		
7. Fission Products Development Laboratory	-	<0.01	-	<0.01	-		
8. Waste Evaporator, Bldg. 2531	4.8	0.02	3.4	0.65	19.9		
9. Building 3525	≤ 0.4	<0.01	-	0.03	0.9		
10. Building 2026	0.5	<0.01	-	0.18	5.5		
11. Tank Farm Drainage	98	0.29	50.1	0.52	16.0		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Activity ^b (Microcuries)	Particulate Activity ^b (Microcuries)
HLAL	2026	0	2	
Central Radioactive Gas Disposal Facilities	3039	0.05		442
Radiochemical-Processing Pilot Plant	3020	0		2
MSRE	7512	0		0
HFIR	7911	0.01		30
Total Activity in Gases Released at X-10 Site		0.06		476
Isotopes Division - Y-12 Area			4 x 10 ⁻¹	
Tritium Target Fabrication Building			10.0 ^c (3H)	
Building 4508 Ventilation Discharges				7 x 10 ⁻⁵
Room 136				3 x 10 ⁻⁴
Room 265				

^a Activity primarily ¹³¹I except as noted.

^b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

^c This value contains the November discharge also.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3 4 5	5.6 6.7 7.2	9.0 >9.5 7.6	30 ^d 1 ^e None	32.5 1 -
Dissolved Oxygen	5 ppm min.	3 4 5	3.0 11.0 6.3	14.4 >15.0 13.1	2 None None	36 - -
Temp.	<30°C < 2°C/hr change	3 4 5	7.8 <5.0 6.3	15.0 13.8 14.3	None None None	- - -

^aThese measurements are continuous and are recorded.

^bThese are Tennessee Water Quality Criteria standards.

^cRefer to Figure 7.

^dThirty excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 26 excursions, and the Building 3004 demineralizer was responsible for four excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

^eThis excursion was due to pumping the HFIR pond and resulted in a change greater than one unit per day.

Table 5. Concentration of Nonradioactive Effluents

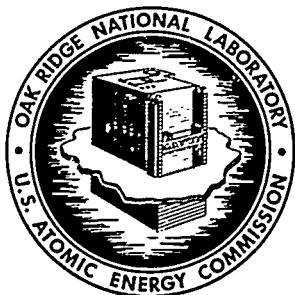
Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.05	0.71	0.11	0.02
Zn	0.1	0.02	0.08	<0.01	<0.01
P	1	0.30	0.33	0.19	0.01
NO ₃ (as N)	10	0.69	0.47	0.90	0.23
Hg	0.005	0.0043	c	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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CENTRAL FILES NUMBER

75-3-16

DATE: March 14, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1975

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamm 7/11/96
 Technical Information Officer Date
 ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of January, 1975, was 0.78% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.54% MPC_W, and 0.20% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.4 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The discharge from the process-waste treatment plant was higher than normal because of an unexplained decrease in removal efficiency. This, plus the discharge from the burial ground, accounts for the high discharge noted at the White Oak Creek monitoring station.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 234 gph.

	<u>Gallons</u>
Total volume generated	166,000
Volume transferred to evaporator	174,000
Tank Farm free space at beginning of month	412,000
Tank Farm free space at end of month	407,000
Evaporator concentrate returned to tank farm	13,000
Volume of concentrate available for hydrofracture (South Tank Farm)	143,000
Volume of concentrate at hydrofracture site	41,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	19,000
Fission Products Development Laboratory	15,800
ORR and BSR	26,600
High Flux Isotope Reactor	20,300
Radioisotopes Processing Area	8,400
4500 Complex	14,900
Transuranium Processing Area	2,900

SHALE FRACTURE OPERATIONS

ILW injection No. 12 was completed on January 24, 1975. The injection was made into a new slot at a depth of 822 feet. Only 25,000 gallons of waste were injected because of difficulties in moving the blended cement from the storage bins. The solids mixture had been in storage for about 3.5 months prior to the injection. The injected waste contained 11,500 Ci of ^{137}Cs , 116 Ci of ^{134}Cs , 344 Ci of ^{106}Ru , 370 Ci of ^{90}Sr , and 0.07 grams of ^{244}Cm .

GASEOUS WASTE

The ORNL stacks discharged 100 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 440 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards 39 times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

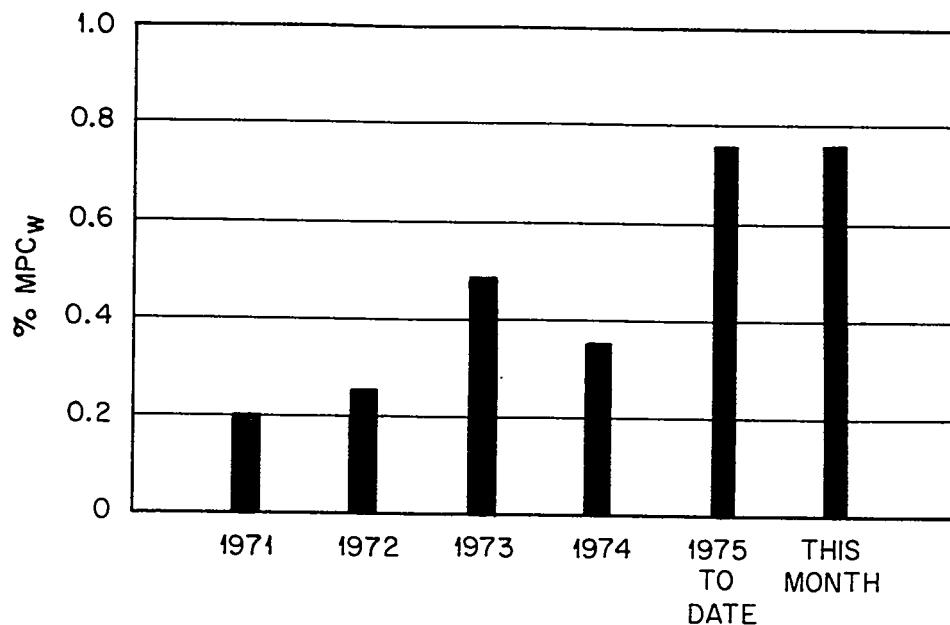


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

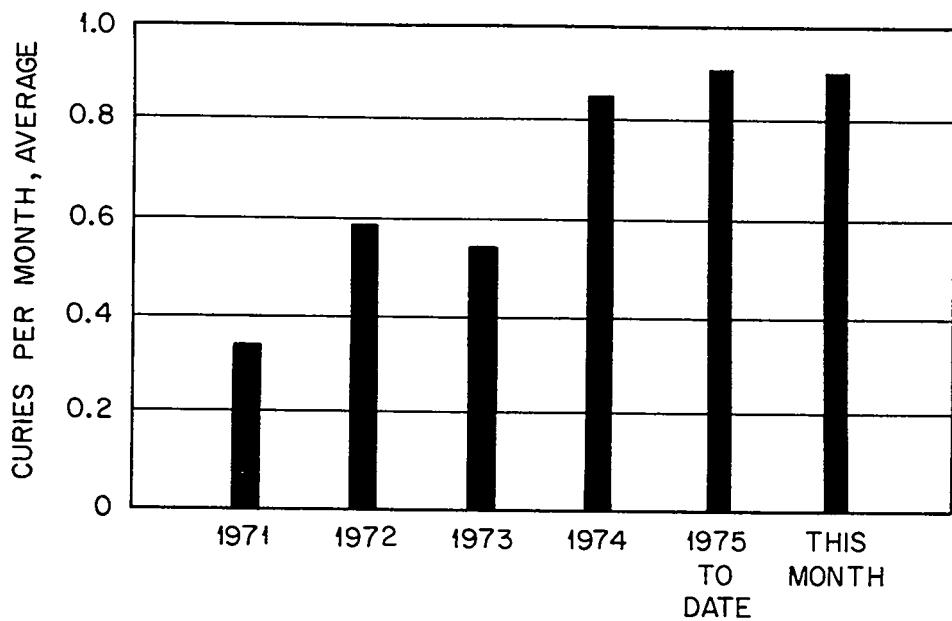


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

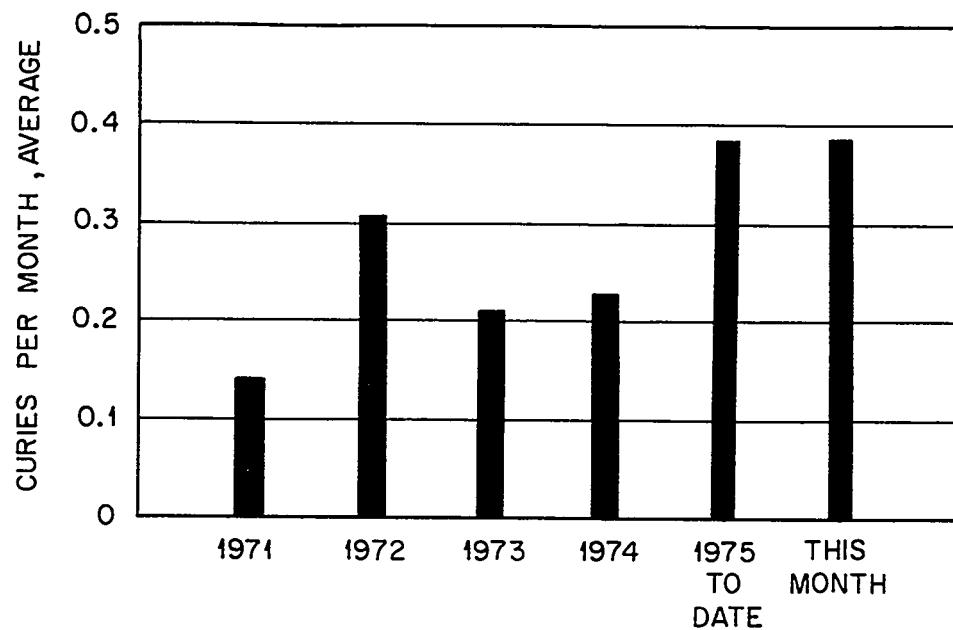


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

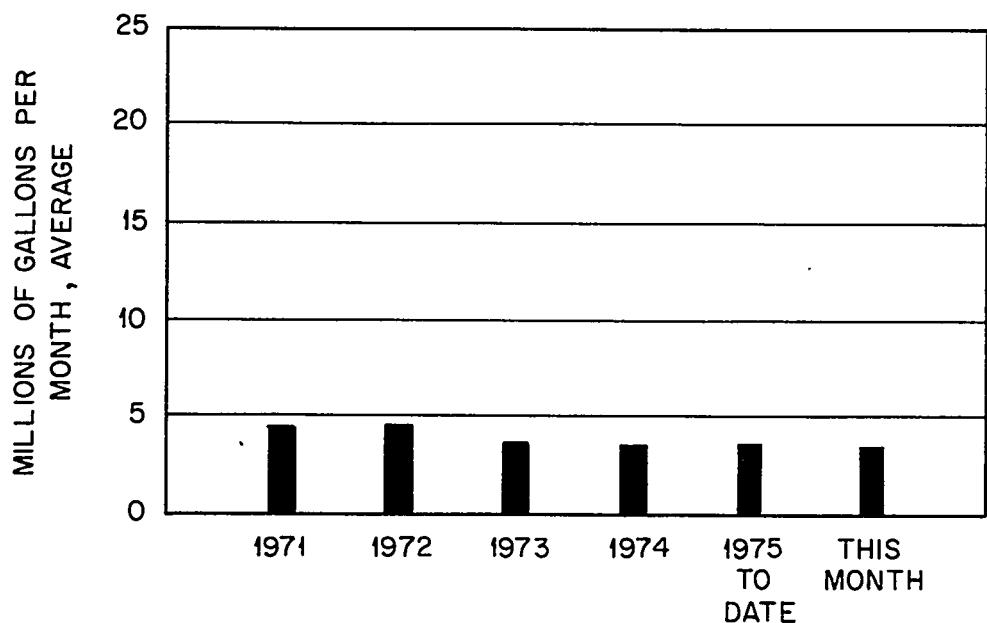


Fig 4. Process Waste Volumes.

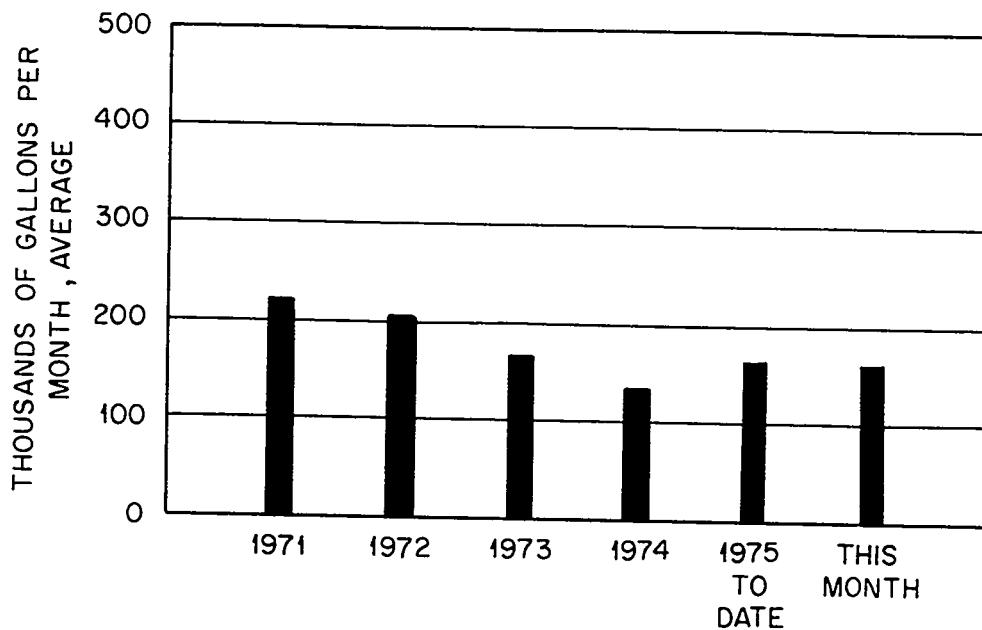


Fig 5. Intermediate - Level Waste Volumes.

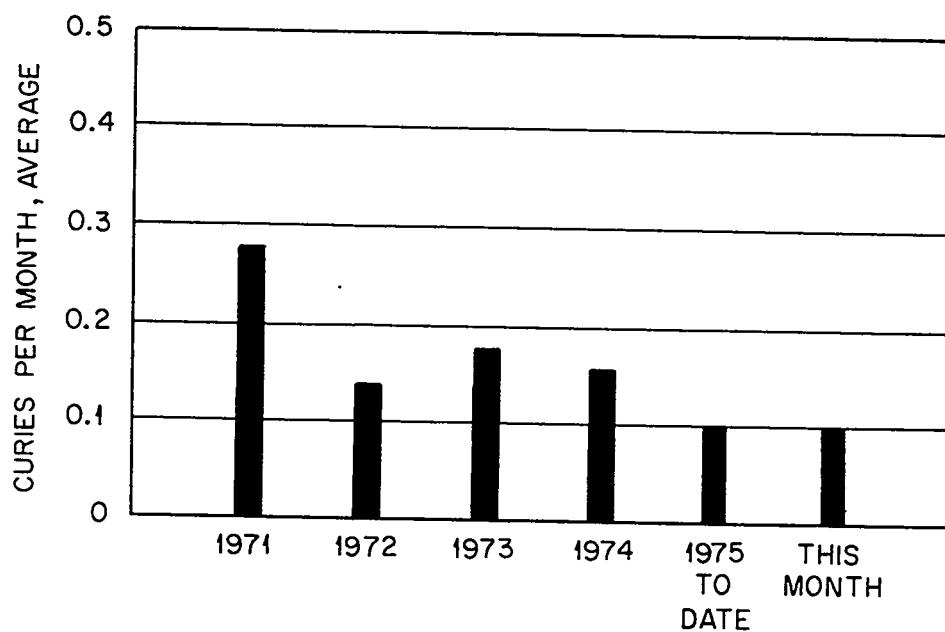


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

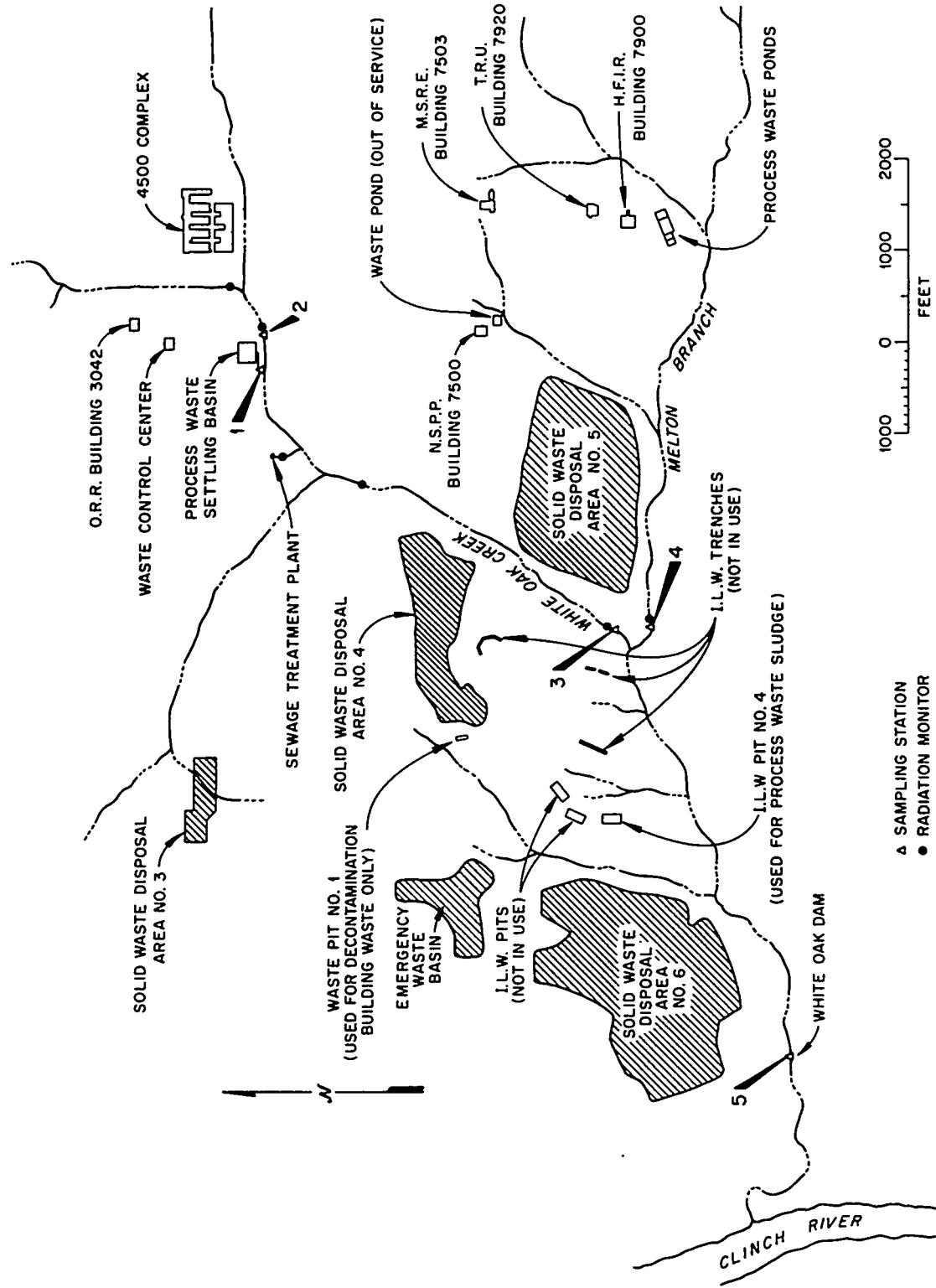


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.03	0.18
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.84	1.38
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.07	0.14
Total discharge from all sources	3,4	0.91	1.52
White Oak Dam to Clinch River (Health Physics measurement)	5	0.84	1.12

^aRefers to Fig. 7

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity c/m ^a /m ³	Average	Gross-Beta		Volume Million Gallons	% of Total
			Curies ^b	% of Total		
1. Radioisotopes Processing Area (MH234)		152.0	0.04	4.5	0.05	1.2
2. Radioisotopes Processing Area (MH114 minus MH112)		-	0.26 ^c	29.5	0.27	6.3
3. Reactor Operations (MH112)	4.1	0.02	2.3	0.69	16.0	
4. Buildings 3503 and 3508	1.9	<0.01	-	0.37	8.5	
5. Building 3025 and 3026	3.5	<0.01	-	0.37	8.5	
6. Building 3019	7.6	0.02	2.3	0.49	11.3	
7. Fission Products Development Laboratory	-	<0.01	-	<0.01	-	11
8. Waste Evaporator, Bldg. 2531	3.5	0.02	2.3	0.85	19.7	
9. Building 3525	8.8	<0.01	-	0.02	0.5	
10. Building 2026	<0.2	<0.01	-	0.14	3.2	
11. Tank Farm Drainage	86.1	0.52	59.1	1.07	24.8	

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)	
			12	12
HRLAL	2026	0		0
Central Radioactive Gas Disposal Facilities	3039	0.09		415
Radiochemical-Processing Pilot Plant	3020	0		2
MSRE	7512	0		0
HFIR	7911	0.01		23
Total Activity in Gases Released at X-10 Site		0.10	440	12
Isotopes Division - Y-12 Area			4×10^{-1}	
Tritium Target Fabrication Building		c (^3H)		
Building 4508 Ventilation Discharges				
Room 136			9×10^{-4}	
Room 265			7×10^{-5}	

^aActivity primarily ^{131}I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.^cThis will be included with the February, 1975, data.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam

Measurement ^a	Standard ^b	Sample Point ^c	Reading		Times Out of Compliance, Hrs	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3 4 5	5.0 6.9 7.3	9.1 7.6 7.7	39 None None	29.5 ^d
Dissolved Oxygen	5 ppm Min.	3 4 5	5.0 8.7 5.0	>15.0 >15.0 14.4	None None None	- - -
Temp.	<30°C < 2°C/hr change	3 4 5	6.9 <5.0 6.5	14.5 14.3 14.8	None None None	- - -

a.These measurements are continuous and are recorded.

b.These are Tennessee Water Quality Criteria standards.

c.Refer to Figure 7.

d.Thirty-nine excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 33 excursions, and the Building 3004 demineralizer was responsible for six excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.06	0.44	0.11	0.02
Zn	0.1	0.02	0.07	0.02	<0.01
P	1	0.12	0.12	0.10	0.01
NO ₃ (as N)	10	0.39	0.24	0.45	0.26
Hg	0.005	0.0011	c	0.0002	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

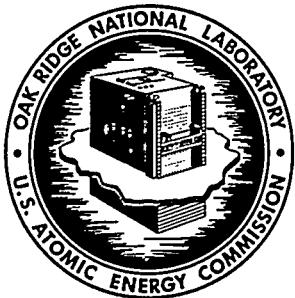
Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DATE ISSUED

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ORNL
CENTRAL FILES NUMBER

75-4-16

DATE: April 22, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1975

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Daniel R. Hamrin 7/11/96

Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of February, 1975, was 0.32% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.23% MPC_W and 0.07% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The discharge from the process waste treatment plant returned to normal as a result of an increase in plant efficiency. However, the discharge from the burial ground is still high because of the higher rainfall.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 204 gph.

	<u>Gallons</u>
Total volume generated	137,000
Volume transferred to evaporator	126,000
Tank Farm free space at beginning of month	407,000
Tank Farm free space at end of month	432,000
Evaporator concentrate returned to tank farm	12,000
Volume of concentrate available for hydrofracture (South Tank Farm)	107,000
Volume of concentrate at hydrofracture site	89,000*

* 48,000 gallons of ILW concentrate were pumped to the hydrofracture site in preparation for another injection.

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	37,400
Fission Products Development Laboratory	13,600
ORR and BSR	10,500
High Flux Isotope Reactor	25,600
Radioisotopes Processing Area	6,800
4500 Complex	2,700
Transuranium Processing Area	2,300

GASEOUS WASTE

The ORNL stacks discharged 240 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 315 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.2% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The Building 5505 hood and glove box ventilation ducts have been equipped with filter paper samplers and the gross alpha particulate discharges will be reported each month.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MONITORING

Effluent limitations and monitoring requirements specified in the NPDES permit for HNL became effective February 15, 1975. The permit was issued by the Environmental Protection Agency and applies to discharges from White Oak Creek (Station 3), Melton Branch (Station 4), the 2521 Sanitary Treatment Plant and the 7904 Sanitary Treatment Plant. The permit specifies the parameters to be monitored, the limitations (if any) on these parameters and the type and frequency of sampling.

Table 4 presents the monitoring data for White Oak Creek and Melton Branch and Table 5 presents that for the two sanitary treatment plants. The data in these tables cover the period from February 15, 1975, through February 28, 1975. Since some of the limits in the permit are not yet

applicable, the only parameter that exceeded the limitation was the total chromium in Melton Branch. Table 6 presents the results of other chemical monitoring from White Oak Creek, Melton Branch, the effluent from White Oak Dam and from a point on the Clinch River upstream from where White Oak Creek empties into the river. Although these parameters are not specified in the NPDES permit, these chemicals are monitored since they either represent large usages at the Laboratory or could become problems in the future.

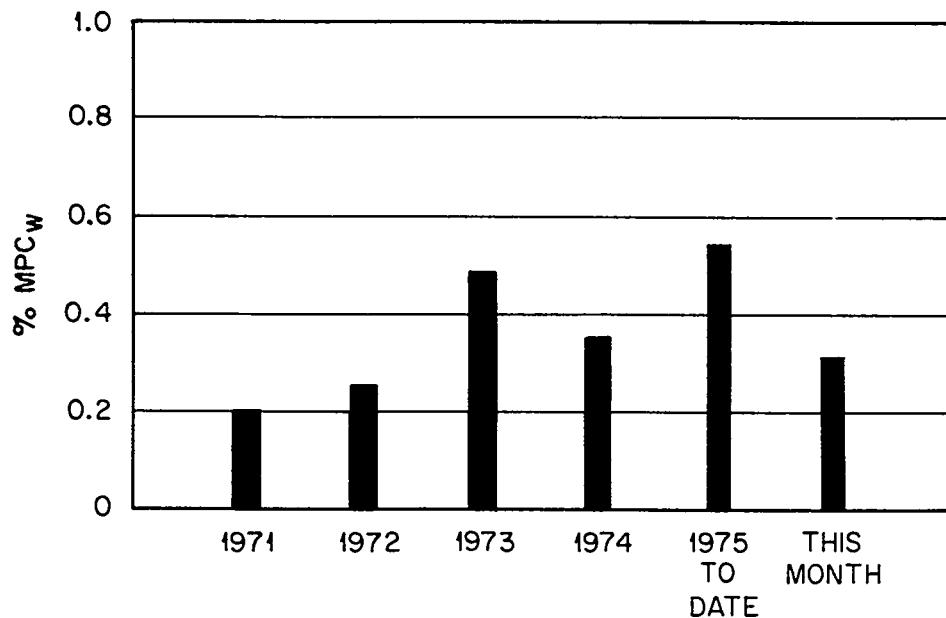


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

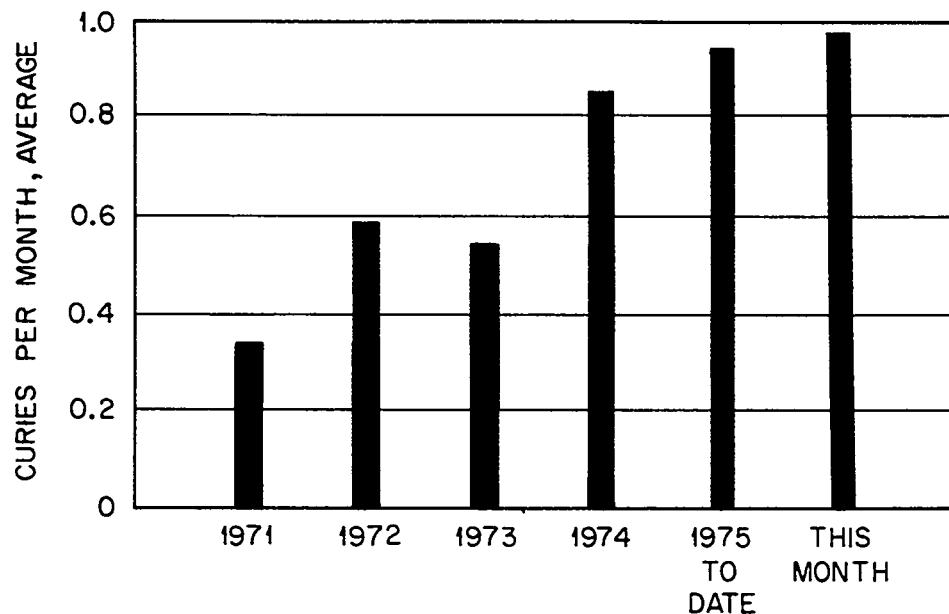


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

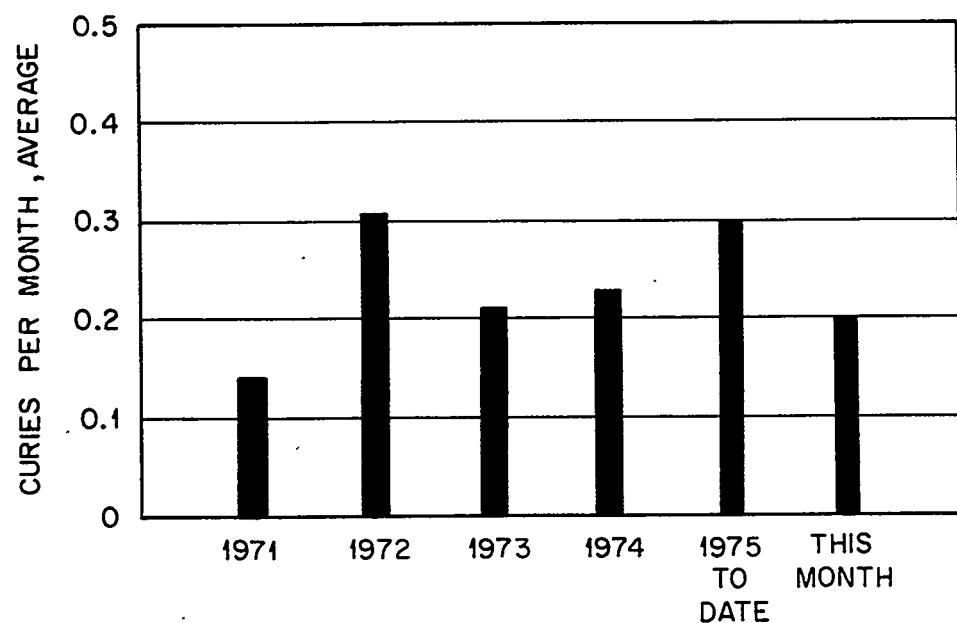


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

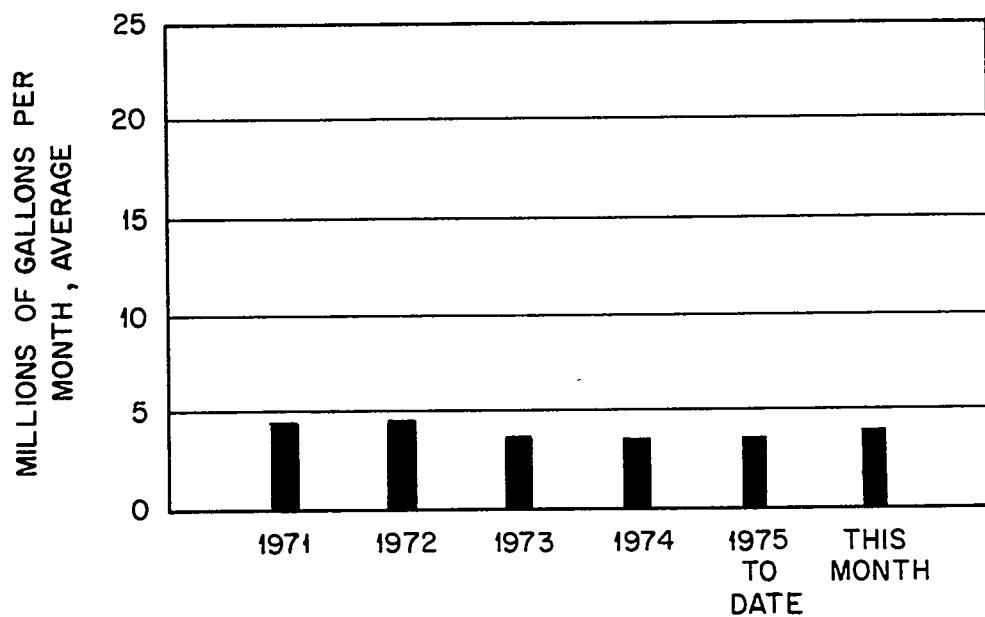


Fig 4. Process Waste Volumes.

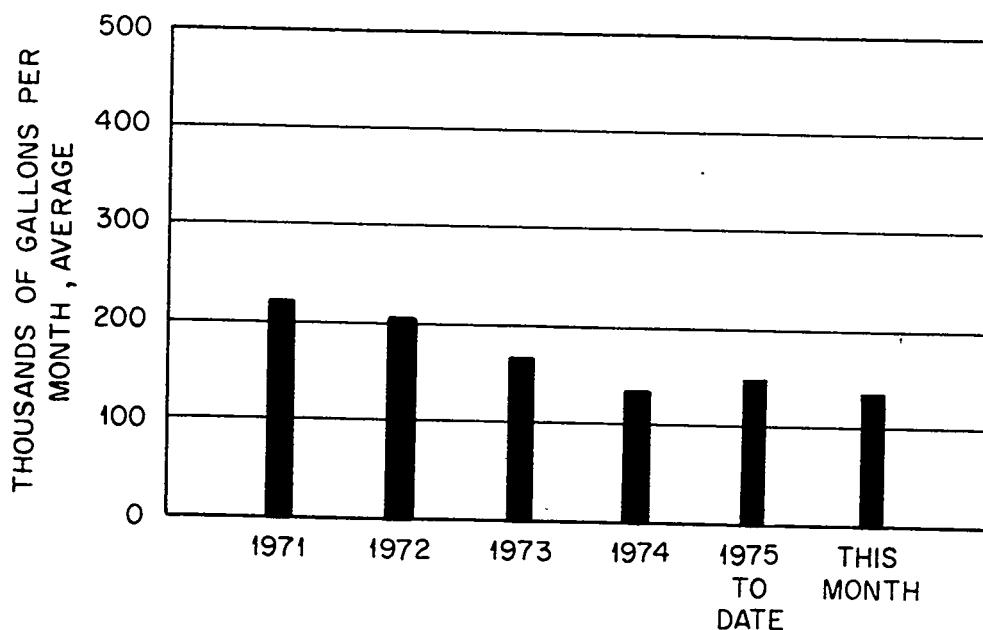


Fig 5. Intermediate - Level Waste Volumes.

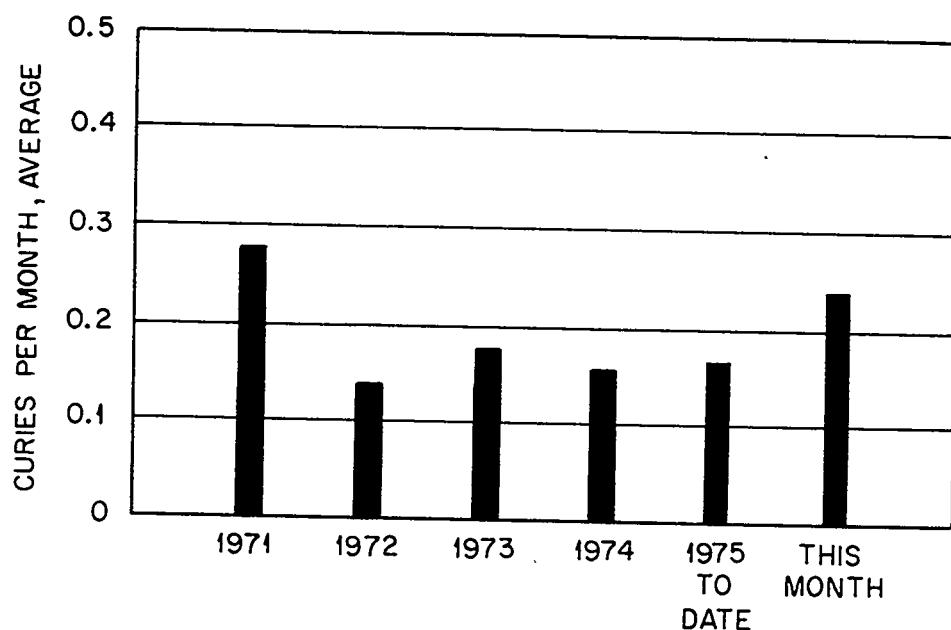


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

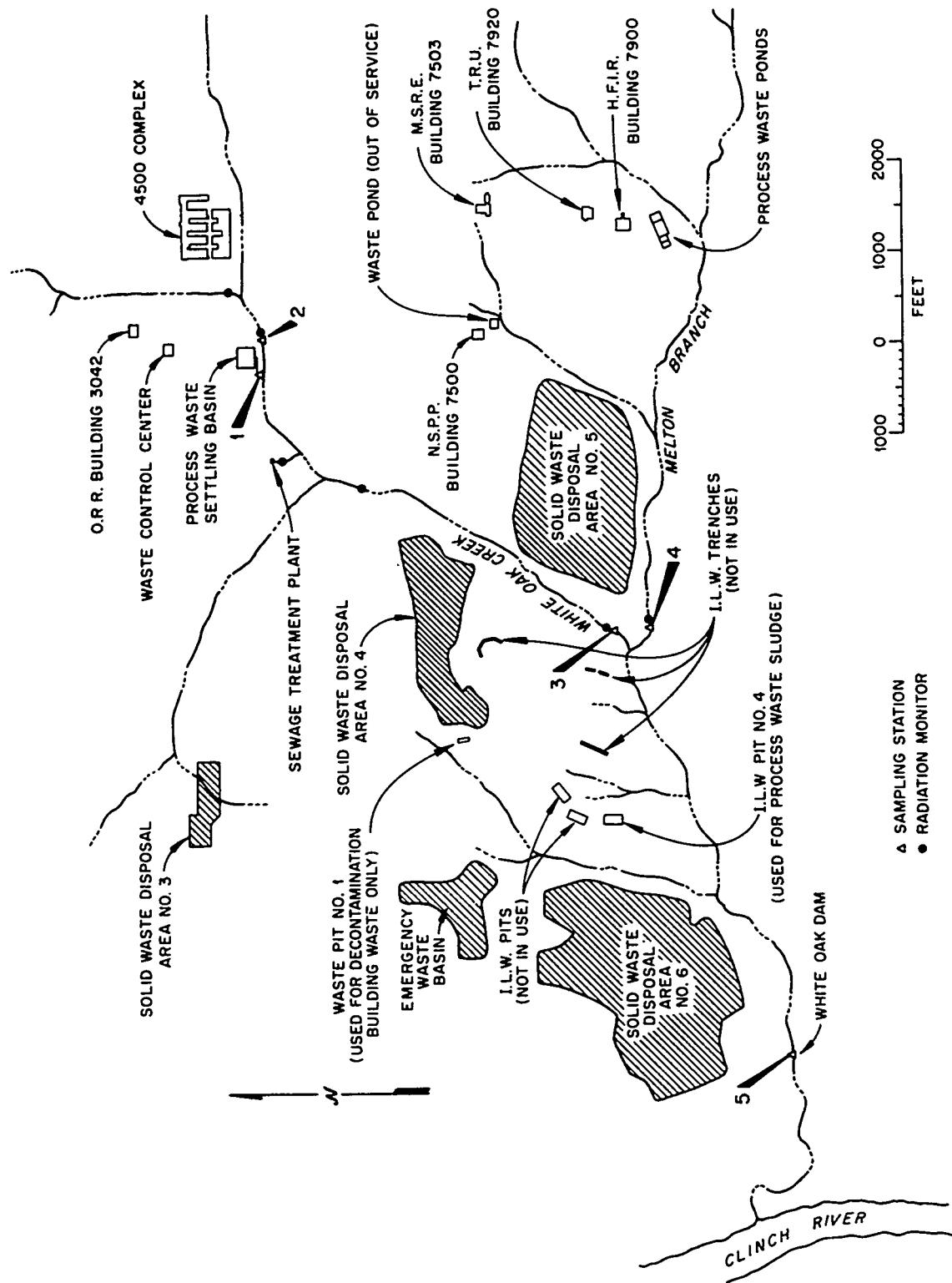


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta Curies ^b
Miscellaneous discharges from east end of plant	1	0.20	0.29
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	<u>< 0.02</u>	<u>< 0.20</u>
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.80	1.81
Total discharge from all sources	4	0.18	0.30
White Oak Dam. to Clinch River (Health Physics measurement)	3,4	0.98	2.11
	5	0.60	1.36

^aRefers to Fig. 7

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ ^a	Gross-Beta Curies ^b	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	140.0	0.04	5.0	0.05	1.3
2. Radioisotopes Processing Area (MH114 minus MH112)		0.20 ^c	25.0	0.28	7.3
3. Reactor Operations (MH112)	9.4	0.02	2.5	0.45	11.7
4. Building 3503 and 3508	≤ 2.3	< 0.01	—	0.27	7.0
5. Building 3025 and 3026	3.3	< 0.01	—	0.42	10.9
6. Building 3019	≤ 3.5	≤ 0.02	≤ 2.5	0.76	19.8
7. Fission Products Development Laboratory		< 0.01	—	< 0.01	—
8. Waste Evaporator, Bldg. 2531	4.9	0.02	2.5	0.57	14.9
9. Building 3525	≤ 0.2	< 0.01	—	0.02	0.5
10. Building 2026	0.3	< 0.01	—	0.11	2.9
11. Tank Farm Drainage	97.2	0.50	62.5	0.91	23.7

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area		Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL			
Central Radioactive Gas Disposal Facilities	Stack No. 2026	0	1
Radiochemical-Processing Pilot Plant	3039	0.24	281
MSRE	3020	0	1
HFIR	7512	0	0
Total Activity in Gases Released at X-10 Site	7911	< 0.01	32
Isotopes Division - Y-12 Area			
Tritium Target Fabrication Building			
Building 4508 Ventilation Discharges			
Room 136	0.24	315	
Room 265			4×10^{-1}
Building 5505 Discharges			
Glove Box	0.90 (^3H) ^c		
Hood			
			$\leq 3 \times 10^{-4}$
			$\leq 7 \times 10^{-5}$
			2×10^{-1}
			$\leq 5 \times 10^{-4}$

^aActivity primarily ^{131}I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.^cThis includes the discharge for January.

Table 4. National Pollutant Discharge Elimination
System Monitoring

White Oak Creek						
Parameter	Permit Condition	Units	Measurement	Maximum	Average	Type Sample
Flow	None	MGD	8.528	12.757	20.348	Cont.
BOD	None	mg/l	6			Grab
COD	None	mg/l	< 10	< 13	16	Grab
Chromium (Total)	0.05 max*	mg/l		< 0.010		Comp.
Dissolved Oxygen	5.0 min*	mg/l	4.8	NA	10.4	Cont.
Dissolved Solids	2000	mg/l	120	127.7	137	Comp.
Oil & Grease	10 Ave, 15 max	mg/l		4	4	Grab
pH	6.0-9.0*		< 4.5	-	9.0	Cont.
Suspended Solids	None	mg/l	≥ 4	4	4	Comp.
Turbidity	None	NTU	5.2	5.7	6.1	Grab
Melton Branch						
Flow	None	MGD	1.401	2.900	6.662	Cont.
BOD	None	mg/l	1.0	2.2	3.4	Grab
COD	None	mg/l	<10	< 11	12	Grab
Chromium (Total)	0.05	mg/l	0.33	0.44	0.55	Comp.
Dissolved Oxygen	None	mg/l	5.7	-	12.9	Cont.
Dissolved Solids	None	mg/l		163		Comp.
Oil and Grease	10 Ave, 15 max	mg/l		3	3	Grab
pH	6.0-9.0		6.9	-	7.9	Cont.
Suspended Solids	None	mg/l	5	5.5	6	Comp.
Turbidity	None	NTU	3.9	4.2	4.4	Grab

*These limitations become effective July 1, 1977

Table 3. National Pollutant Discharge Elimination System Monitoring

2521 Sanitary Treatment Plant

14

Parameter	Permit Condition	Units	Measurement			Type
			Minimum	Average	Maximum	Sample
Flow	None	MGD	0.071	0.214	0.312	Cont.
Ammonia (N)-Effluent	5 max*	mg/l			11.5	Comp.
Ammonia (N)-Effluent	15 max*	lbs/day			20.2	Comp.
BOD - Influent	None	mg/l	35	54.7	71.5	Comp.
BOD - Effluent	20 max*	mg/l	57.5	58.7	60	Comp.
BOD - Effluent	60 max*	lbs/day			105.1	Comp.
Cl ₂ Residual - Effluent	0.5-2.0*	mg/l	0.0	1.4	2.0	Grab
Fecal Coliform - Effluent	200/100max*	colonies per 100 ml			40	Grab
pH - Effluent	6.0-9.0		7.1	7.3	7.6	Grab
Settleable Solids-Effluent	0.5max*	ml/l	< 0.1	< 0.2	0.3	Grab
Suspended Solids-Effluent	30max*	mg/l	42	42.5	43	Comp.
Suspended Solids-Effluent	90max*	lbs/day			78.6	Comp.
7904 Sanitary Treatment Plant						
Flow	None	MGD	0.005	0.006	0.007	Cont.
Ammonia (N)-Effluent	None	mg/l		3.9		Grab
BOD - Influent	None	mg/l		58		Comp.
BOD - Effluent	30 max	mg/l			5	Comp.
BOD - Effluent	1.75 max	lbs/day			0.29	Comp.
Cl ₂ Residual - Effluent	0.5-2.0	mg/l	1.0	1.0	1.0	Grab
Fecal Coliform - Effluent	200/100max	colonies per 100 ml			0	Grab
pH - Effluent	6.0-9.0		6.9	7.1	7.4	Grab
Settleable Solids-Effluent	0.5 max	ml/l	< 0.1	< 0.1	< 0.1	Comp.
Suspended Solids - Inlet	None	mg/l		57		Comp.
Suspended Solids-Effluent	30	mg/l			8	Comp.
Suspended Solids-Effluent	1.75	lbs/day			0.47	Comp.

*These limitations become effective July 1, 1975

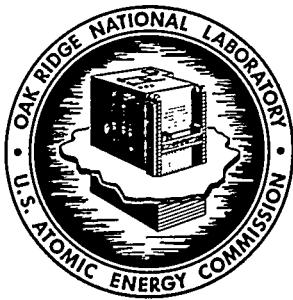
Table 6. Concentration of Nonradioactive Effluents

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	c	c	0.090	0.020
Zn	0.1	0.016	0.030	0.009	0.006
P (total)	1	0.13	0.10	0.10	0.01
NO ₃ (as N)	10	3.7	0.3	0.6	0.4
Hg	0.005	0.0030	d	0.0015	< 0.0001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. These data are reported in Table 4.
- d. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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CENTRAL FILES NUMBER

75-5-8

DATE: May 12, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March, 1975

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamer 7/10/96

 Technical Information Officer Date
 ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of March, 1975, was 0.78% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.67% MPC_W and 0.06% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The unusually high rainfall during the month of March resulted in high discharges to White Oak Creek and Melton Branch from burial grounds 4 and 5, respectively.

Process Waste

A total of 4.8 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The hard rains apparently resulted in a heavy run-off through the settling basin causing a high discharge from that source. The flow through the settling basin was slightly more than twice normal flow.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 241 gph.

	<u>Gallons</u>
Total volume generated	199,000
Volume transferred to evaporator	179,000
Tank Farm free space at beginning of month	432,000
Tank Farm free space at end of month	399,000
Evaporator concentrate returned to tank farm	13,000
Volume of concentrate available for hydrofracture (South Tank Farm)	117,000
Volume of concentrate at hydrofracture site	89,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	42,400
Fission Products Development Laboratory	18,300
ORR and BSR	29,900
High Flux Isotope Reactor	26,400
Radioisotopes Processing Area	8,600
4500 Complex	10,500
Transuranium Processing Area	2,900

GASEOUS WASTE

The ORNL stack discharged 100 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 715 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.3% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MONITORING

Effluent limitations and monitoring requirements specified in the NPDES permit for HNL apply to discharges from White Oak Creek (Station 3), Melton Branch (Station 4), the 2521 Sanitary Treatment Plant and the 7904 Sanitary Treatment Plant. The permit specifies the parameters to be monitored, the limitations (if any) on these parameters and the type and frequency of sampling.

Table 4 presents the monitoring data for White Oak Creek and Melton Branch and Table 5 presents that for the two sanitary treatment plants. The new secondary sewage treatment facility for the main treatment plant was placed in service March 19, 1975. It will probably take two to three weeks for this system to become stabilized. Since some of the limits in the permit are not yet applicable, the only parameter that exceeded the

limitation was the total chromium in Melton Branch. Table 6 presents the results of other chemical monitoring from White Oak Creek, Melton Branch, the effluent from White Oak Dam and from a point on the Clinch River upstream from where White Oak Creek empties into the river. Although these parameters are not specified in the NPDES permit, these chemicals are monitored since they either represent large usages at the Laboratory or could become problems in the future.

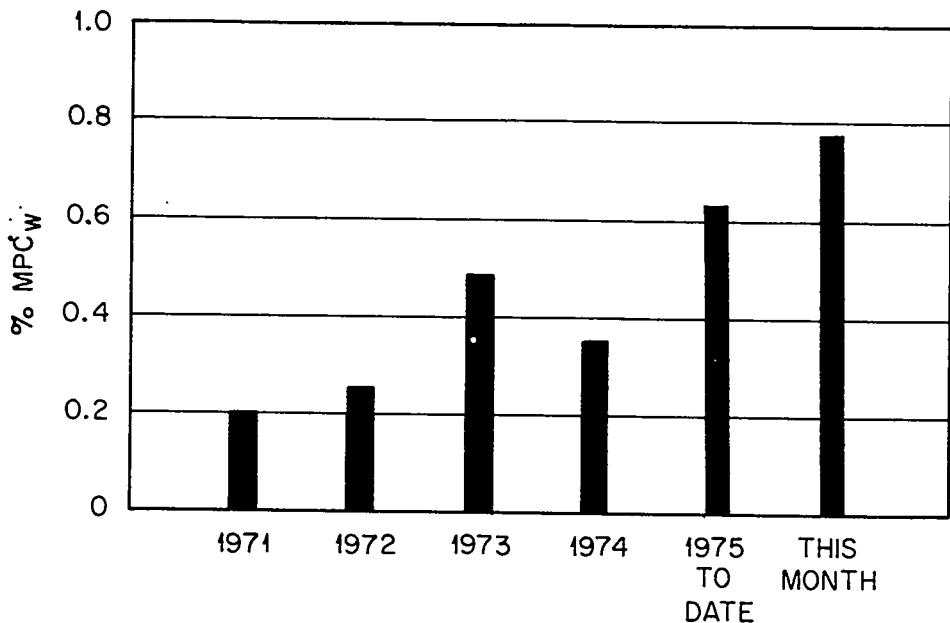


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

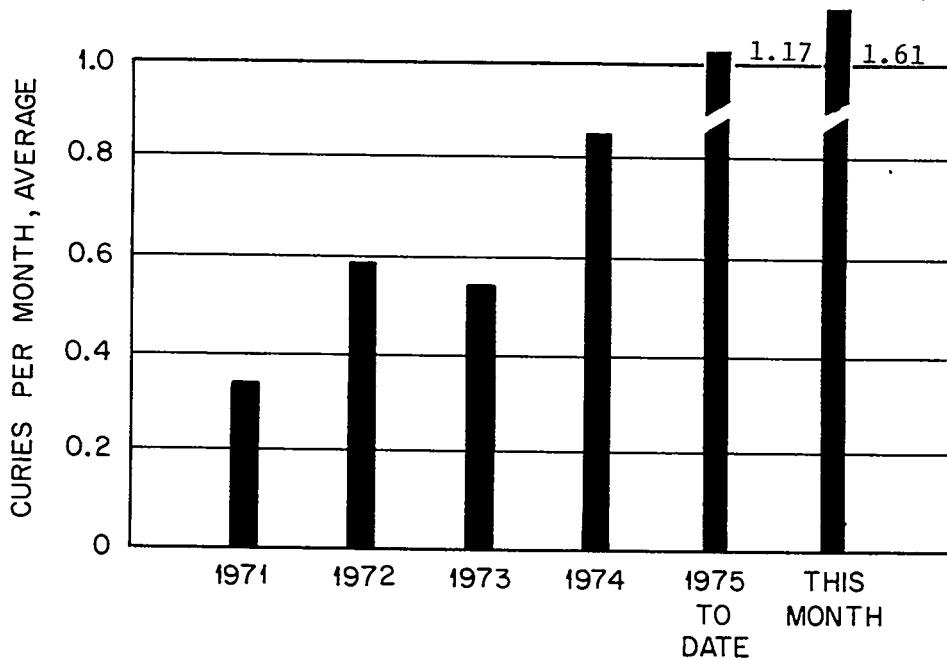


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

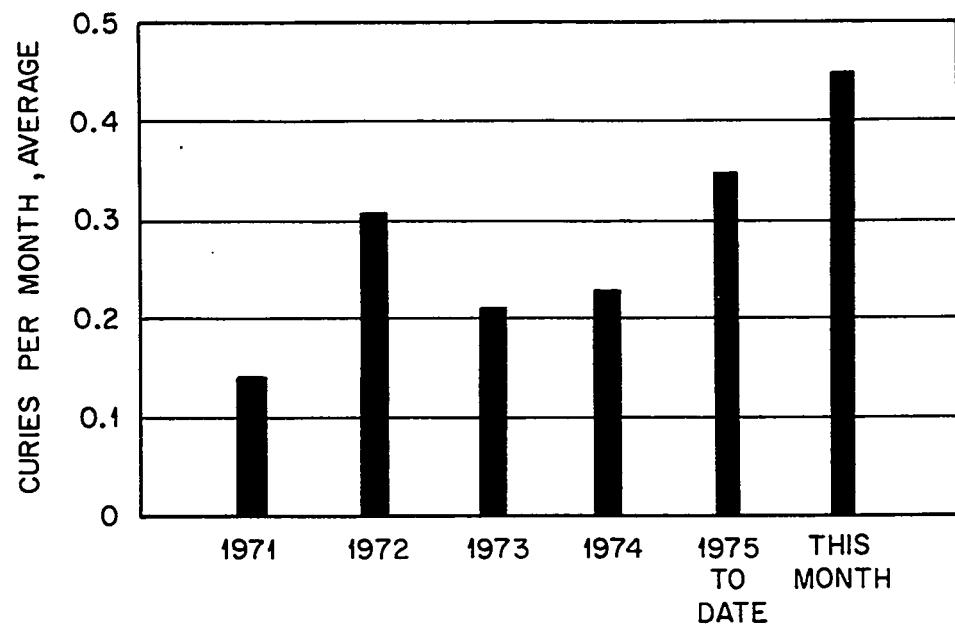


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

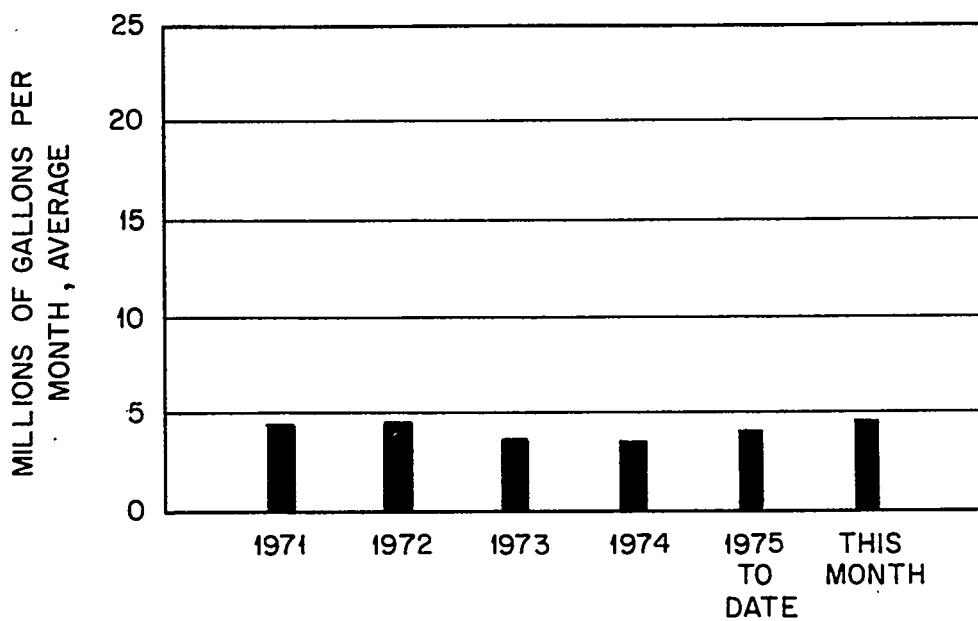


Fig 4. Process Waste Volumes.

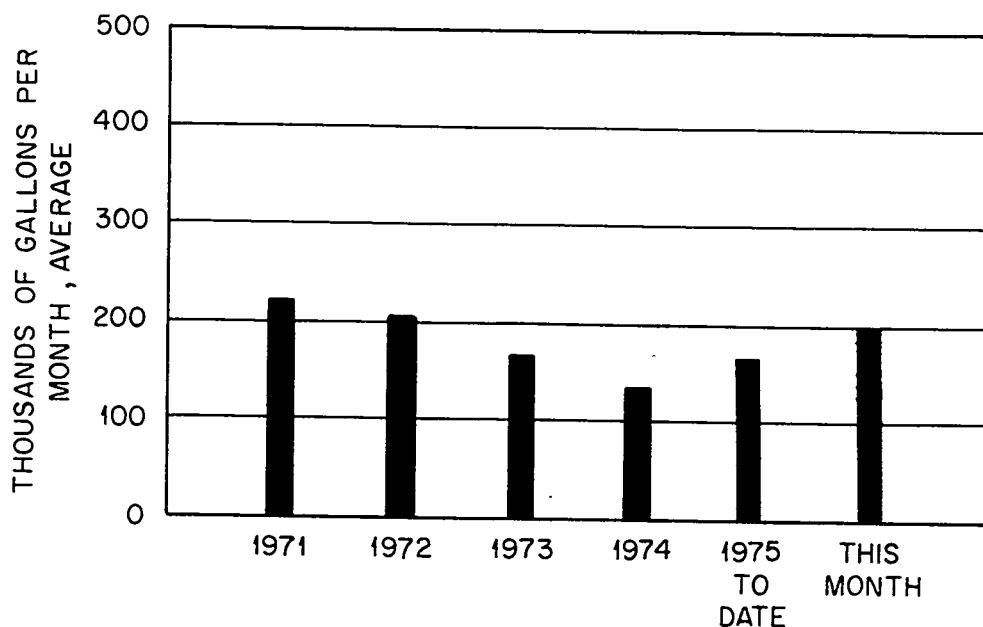


Fig 5. Intermediate - Level Waste Volumes.

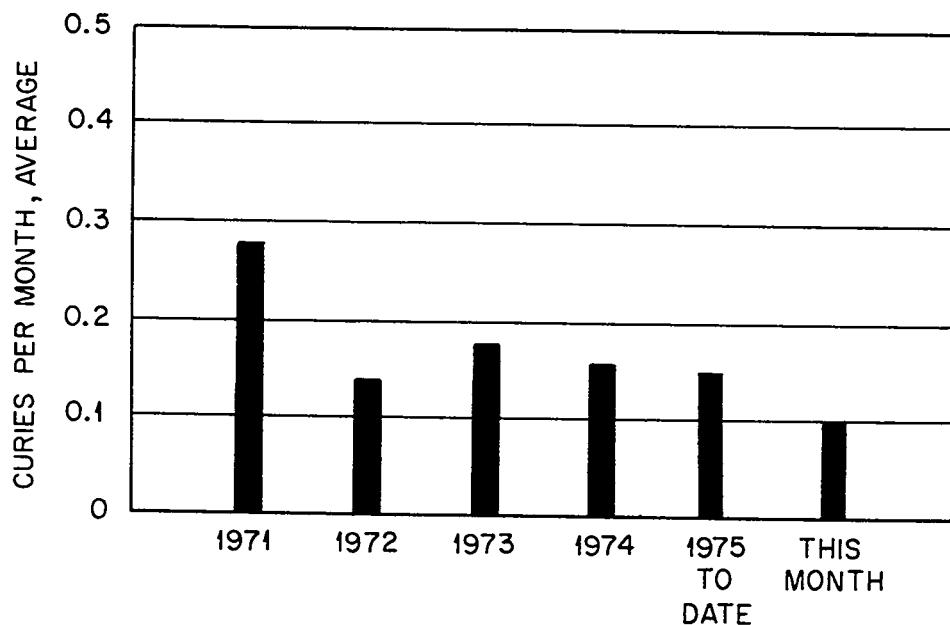


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

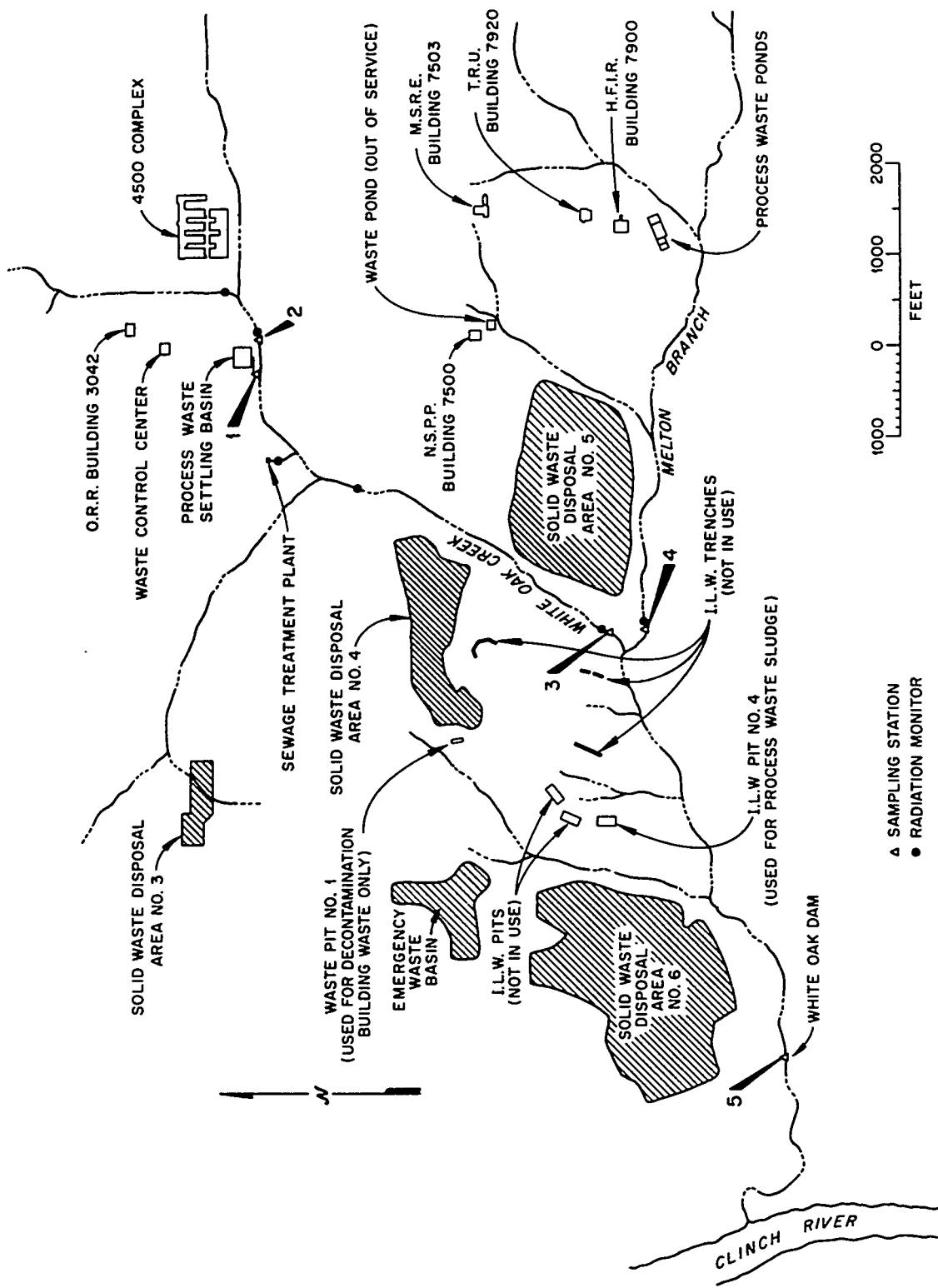


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table I. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.45	0.80
Miscellaneous discharges from east end of plant	2	0.03	0.30
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.03	2.27
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.58	1.39
Total discharge from all sources	3,4	1.61	3.66
White Oak Dam to Clinch River (Health Physics measurement)	5	1.80	3.76

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ^a /ml ^a	Gross-Beta		Gross-Beta		Million Gallons	% of Total	Volume 11
		Curies ^b	% of Total	Curies ^b	% of Total			
1. Radioisotopes Processing Area (MH234)	178	0.08	8.2	0.08	8.2	0.08	1.6	
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.34 ^c	34.7	0.16	1.12	22.3	3.2	
3. Reactor Operations (MH112)	7.4	0.05	5.1	1.12	1.12	22.3		
4. Buildings 3503 and 3508	2.5	<0.01	-	0.20	0.20	4.0		
5. Buildings 3025 and 3026	4.2	0.01	1.0	0.49	0.49	9.8		
6. Building 3019	2.3	0.01	1.0	1.07	1.07	21.3		
7. Fission Products Development Laboratory	-	<0.01	-	<0.01	<0.01	-	-	
8. Waste Evaporator, Bldg. 2531	2.6	0.01	1.0	0.94	0.94	18.7		
9. Building 3525	0.1	<0.01	-	0.01	0.01	0.2		
10. Building 2026	2.5	<0.01	-	0.11	0.11	2.2		
11. Tank Farm Drainage	101	0.48	49.0	0.84	0.84	16.7		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.09	661
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.01	52
Total Activity in Gases Released at X-10 Site		0.10	715
Isotopes Division - Y-12 Area			4×10^{-1}
Tritium Target Fabrication Building		$1.4 \text{ (} ^3\text{H) }^c$	
Building 4508 Ventilation Discharges			
Room 136			$\leq 1.5 \times 10^{-4}$
Room 265			$\leq 3.5 \times 10^{-5}$
Building 5505 Discharges			-
Glove Box			$\leq 2.3 \times 10^{-4}$
Hood			$\leq 3.9 \times 10^{-3}$

^aActivity primarily ^{131}I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.^cThis includes the discharge for January.

Table 4. National Pollutant Discharge Elimination
System Monitoring

White Oak Creek

Parameter	Permit Condition	Units	Minimum	Average	Maximum	Measurement	Type Sample
Flow	None	MGD	5.004	16.666	36.811		Cont.
BOD	None	mg/l		1.0		Grab	
COD	None	mg/l	<10	<10	<10	Grab	
Chromium (Total)	0.05 max*	mg/l		0.02		Comp.	
Dissolved Oxygen	5.0 min*	mg/l	5.3	—	12.0		Cont.
Dissolved Solids	2000	mg/l	78	104.7	193	Comp	
Oil & Grease	10 Ave, 15 max	mg/l		2		Grab	
pH	6.0-9.0*		<4.5	—	9.2		Cont.
Suspended Solids	None	mg/l	5	24.2	35	Comp.	
Turbidity	None	NTU	3.1	15.2	22	Grab	
Melton Branch							
Flow	None	MGD	1.046	4.531	12.931		Cont.
BOD	None	mg/l	<1	<1.82	3	Grab	
COD	None	mg/l	<10	<10	<10	Grab	
Chromium (Total)	0.05	mg/l	0.037	0.099	0.68	Comp.	
Dissolved Oxygen	None	mg/l	10.1	—	>15	Cont.	
Dissolved Solids	None	mg/l		136		Comp.	
Oil & Grease	10 Ave, 15 max	mg/l		3		Grab	
pH	6.0-9.0		6.6	—	8.5		Cont.
Suspended Solids	None	mg/l	3	35	46	Comp	
Turbidity	None	NTU	1.7	17.6	22	Grab	

*These limitations become effective July 1, 1977.

Table 5. National Pollutant Discharge Elimination System Monitoring

2521 Sanitary Treatment Plant

Parameter	Permit Condition	Units	Measurement			Type Sample
			Minimum	Average	Maximum	
Flow	None	MGD	0.079	0.242	0.725	Cont.
Ammonia (N)-Effluent	5 max*	mg/l		1.3		Comp.
Ammonia (N)-Effluent	15 max*	lbs/day		1.77		Comp.
BOD - Influent	None	mg/l	56	77	127	Comp.
BOD - Effluent	20 max*	mg/l	8	27.2	58	Comp.
BOD - Effluent	60 max*	lbs/day		157.2		Comp.
Cl ₂ Residual-Effluent	0.5-2.0*	mg/l	0	1.2	2.0	Grab
Fecal Coliform-Effluent	200/100max*	colonies per 100 ml	0			Grab
pH -Effluent	6.0-9.0		7.1	7.4	7.8	Grab
Settleable Solids-Effluent	0.5 max*	ml/l	<0.1	<0.7	1.0	Grab
Suspended Solids-Effluent	30 max*	mg/l	5	37	65	Comp.
Suspended Solids-Effluent	90 max*	lbs/day		248		Comp.
7904 Sanitary Treatment Plant						
Flow	None	MGD	0.005	0.006	0.007	Cont.
Ammonia (N)-Effluent	None	mg/l		2.0		Grab
BOD - Influent	None	mg/l		85		Comp.
BOD - Effluent	30 max	mg/l		25		Comp.
BOD - Effluent	1.75 max	lbs/day				
Cl ₂ Residual - Effluent	0.5-2.0	mg/l	0.5	.95	1.0	Grab
Fecal Coliform-Effluent	200/100max.	colonies per 100 ml	0			Grab
pH - Effluent	6.0-9.0		7.0	7.3	7.4	Grab
Settleable Solids-Effluent	0.5 max	ml/l	<0.1	<0.1	0.1	Grab
Suspended Solids - Inlet	None	mg/l		13		Comp.
Suspended Solids-Effluent	30	mg/l			9	Comp.
Suspended Solids-Effluent	1.75	lbs/day			0.53	Comp.

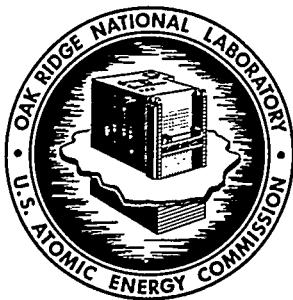
*These limitations become effective July 1, 1975

Table 6. Concentration of Nonradioactive Effluents

Contaminant	Standard ppm ^a	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	c	c	0.06	0.02
Zn	0.1	0.02	0.04	0.01	0.01
P	1	0.09	0.08	0.08	0.01
NO ₃ (as N)	10	0.5	0.4	0.4	0.5
Hg	0.005	0.0015	d	0.0003	< 0.0001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. These data are reported in Table 4.
- d. This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL
CENTRAL FILES NUMBER

75-6-66

DATE: June 16, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1975

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamrin 7/11/96

Technical Information Officer _____ Date _____
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1975, was 0.24% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.18% MPC_W and 0.04% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The strontium measured at Station 4 (Melton Branch) was considerably higher than normal, indicating continued leakage from Burial Ground No. 5 resulting from extremely high rainfall during the previous month.

Process Waste

A total of 2.9 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 169 gph.

	<u>Gallons</u>
Total volume generated	109,000
Volume transferred to evaporator	126,000
Tank Farm free space at beginning of month	399,000
Tank Farm free space at end of month	419,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture (South Tank Farm)	114,000
Volume of concentrate at hydrofracture site	10,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	15,200
Fission Products Development Laboratory	8,200
ORR and BSR	17,900
High Flux Isotope Reactor	15,000
Radioisotopes Process Area	4,000
4500 Complex	6,400
Transuranium Processing Area	3,700

SHALE FRACTURE OPERATIONS

ILW injection No. 13 was completed on April 29, 1975. A total of 81,000 gallons of ILW was pumped into the existing slot at a depth of 822 feet. The waste was slurried with 547,000 pounds of blended solids. The injected waste contained 31,710 Ci of ^{137}Cs , 108 Ci of ^{134}Cs , 773 Ci of ^{106}Ru , 91 Ci of ^{60}Co , 2,029 Ci of ^{90}Sr and 3 $\mu\text{Ci}/\text{Kg}$ of long lined alpha.

GASEOUS WASTE

The ORNL stacks discharged 310 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 314 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MONITORING

Effluent limitations and monitoring requirements specified in the NPDES permit for HNL apply to discharges from White Oak Creek (Station 3), Melton Branch (Station 4), the 2521 Sanitary Treatment Plant and the 7904 Sanitary Treatment Plant. The permit specifies the parameters to be monitored, the limitations (if any) on these parameters and the type and frequency of sampling. Limits are in effect for Melton Branch and the

7904 Sanitary Treatment Plant. Limits for the 2521 Sanitary Treatment Plant become effective July 1, 1975, and those for White Oak Creek become effective July 1, 1977. Since some of the limits in the permit are not yet applicable, the only parameter that exceeded the limitation was the total chromium in Melton Branch. Table 4 presents the results of other chemical monitoring from White Oak Creek, Melton Branch, the effluent from White Oak Dam and from a point on the Clinch River up-stream from where White Oak Creek empties into the river. Although these parameters are not specified in the NPDES permit, these chemicals are monitored since they either represent large usages at the Laboratory or could become problems in the future.

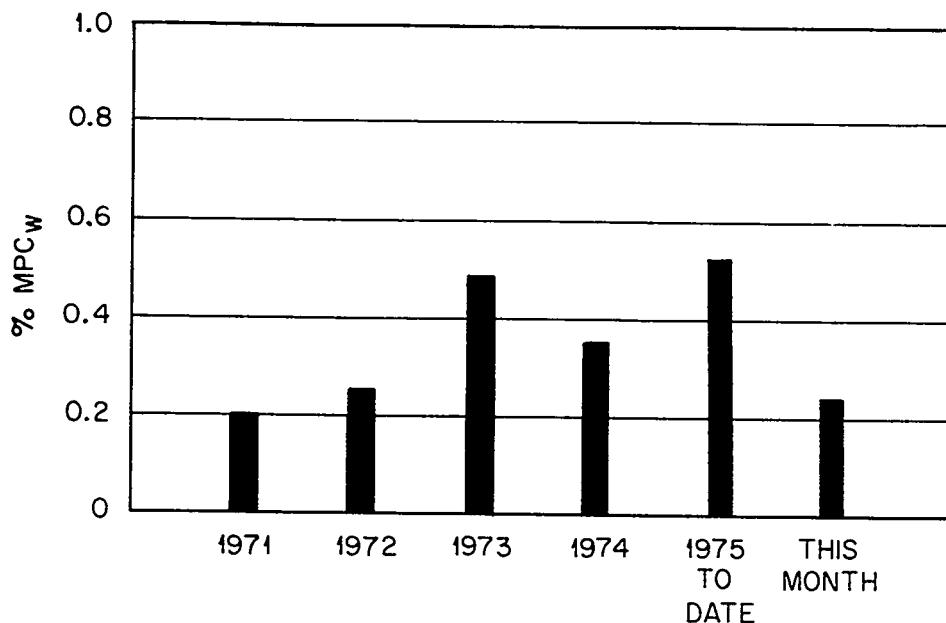


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

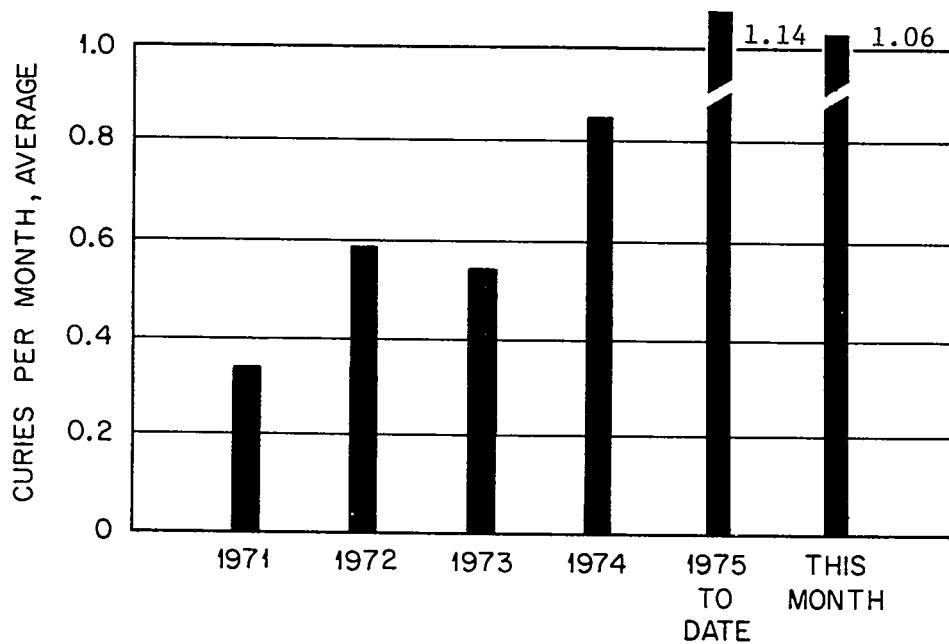


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

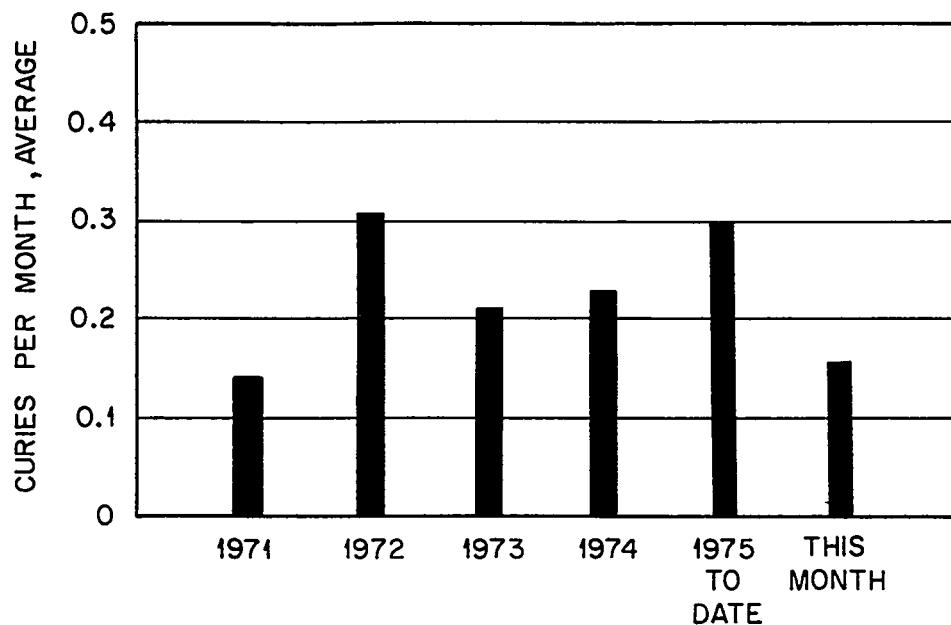


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

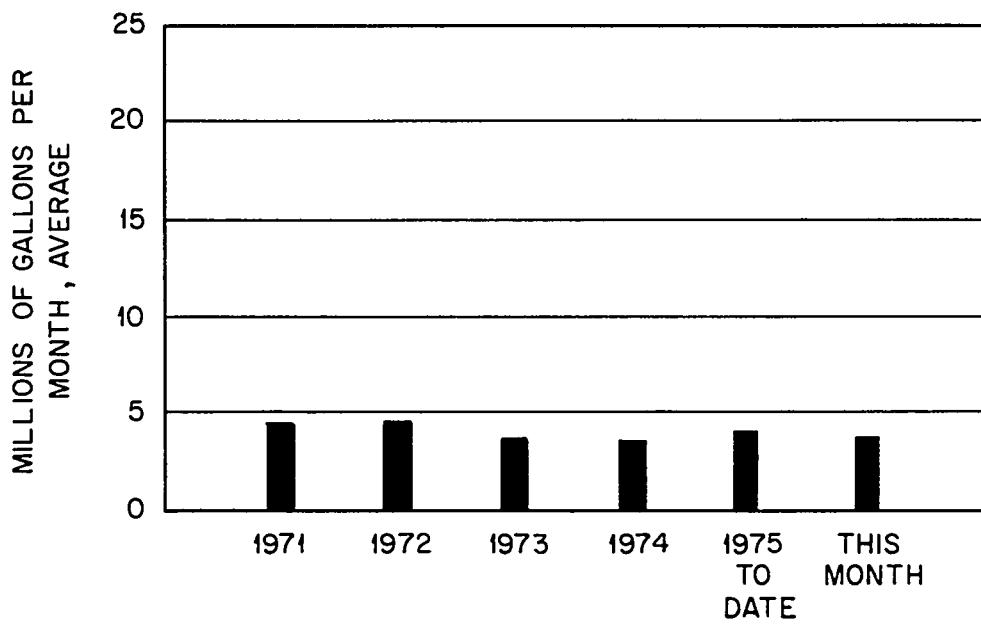


Fig 4. Process Waste Volumes.

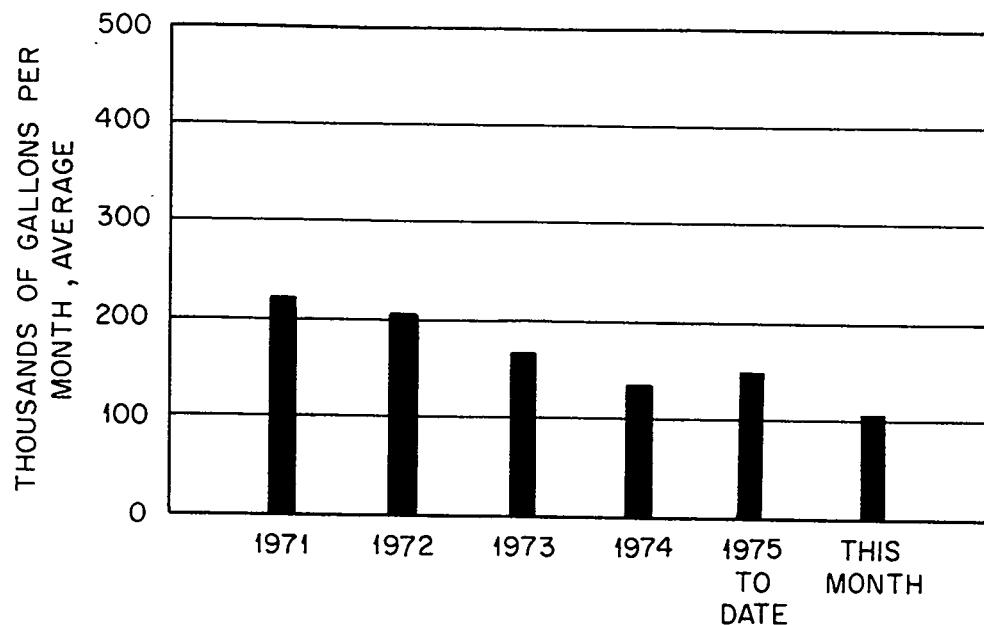


Fig 5. Intermediate - Level Waste Volumes.

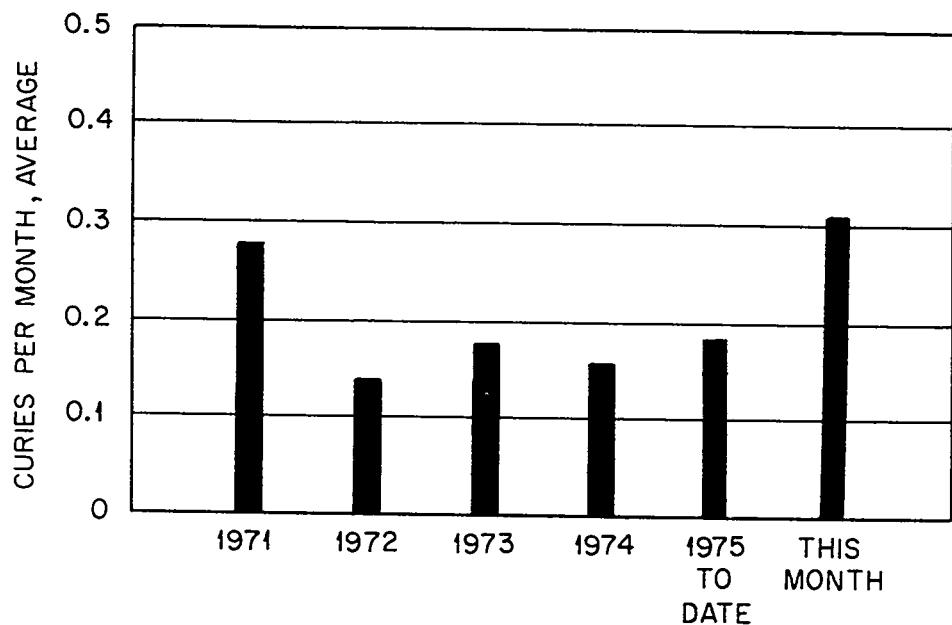


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

ORNL-DWG 65-12157R7

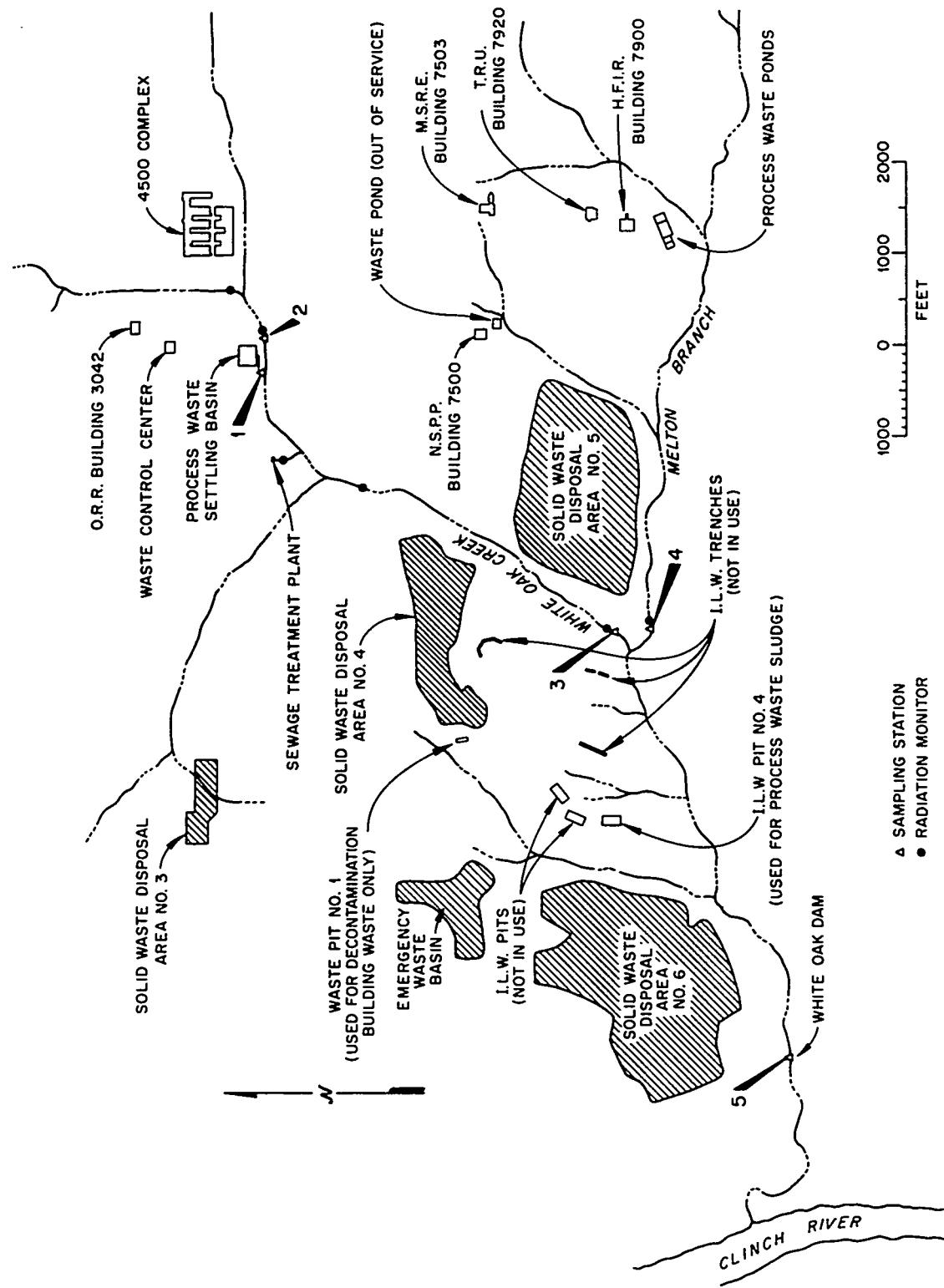


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Numbera	Total Sr, Curies	Gross Beta, Curiesb
Process Waste	1	0.16	0.23
Miscellaneous discharges from east end of plant	2	0.04	0.11
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.44	0.87
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.62	3.75
Total discharge from all sources	3,4	1.06	4.62
White Oak Dam to Clinch River (Health Physics measurement)	5	0.47	1.08

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m/ml ^a	Gross-Beta	Gross-Beta	% of Total	Volume Million Gallons	% of Total
		Curies ^b	Total			
1. Radioisotopes Processing Area (MH234)	163.7	0.07	14.9	0.08	2.0	11
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.14 ^c	29.8	0.15		3.8
3. Reactor Operations (MH112)	8.5	0.02	4.2	0.51		13.1
4. Buildings 3503 and 3508	< 1.4	<0.01	-		0.17	4.4
5. Buildings 3025 and 3026	1.6	<0.01	-		0.44	11.3
6. Building 3019	< 1.9	0.01	2.1	0.95		24.4
7. Fission Products Development Laboratory	-	<0.01	-		<0.01	-
8. Waste Evaporator, Bldg. 2531	< 4.1	<0.02	4.3	0.71		18.2
9. Building 3525	< 0.1	<0.01	-		0.02	0.5
10. Building 2026	0.5	<0.01	-		0.12	3.1
11. Tank Farm Drainage	49.2	0.21	44.6	0.75		19.2

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.28	308
Radiochemical-Process Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.03	5
Total Activity in Gases Released at X-10 Site		0.31	314
Isotopes Division - Y-12 Area			4×10^{-1}
Tritium Target Fabrication Building		0.3 (³ H) ^c	
Building 4508 Ventilation Discharges			
Room 136			3×10^{-4}
Room 265			7×10^{-5}
Building 5505 Discharges			
Glove Box			6×10^{-3}
Hood			8×10^{-4}

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.^cThis includes the discharge for January.

Table 4. Concentration of Nonradioactive Effluents

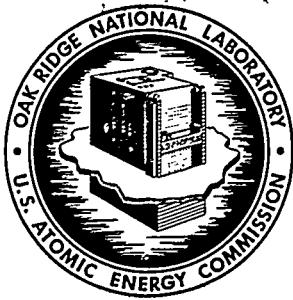
Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.032	0.38	0.100	<0.005
Zn	0.1	0.035	0.074	0.012	<0.005
P	1	0.18	0.29	0.12	0.01
NO ₃ (as N)	10	0.6	0.4	0.4	0.3
Hg	0.005	0.0006	c	0.00003	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.



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ORNL
CENTRAL FILES NUMBER

75-7-18

DATE: July 24, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May, 1975

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

Douglas R. Harriman 7/10/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of May, 1975, was 0.39% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.33% MPC_W and 0.04% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.6 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 137 gph.

	<u>Gallons</u>
Total volume generated	108,000
Volume transferred to evaporator	102,000
Tank Farm free space at beginning of month	*
Tank Farm free space at end of month	416,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	65,000
Volume of concentrate at hydrofracture site	80,000

* The sludge level in each tank was measured during the month and the available free space was revised accordingly. In addition, plummet-type, electronic level indicating instruments replaced the existing pneumatic indicators.

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares to volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	15,200
Fission Products Development Laboratory	14,700
ORR and BSR	9,200
High Flux Isotope Reactor	25,400
Radioisotopes Processing Area	7,200
4500 Complex	4,700
Transuranium Processing Area	4,800

GASEOUS WASTE

The ORNL stacks discharged 330 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 161 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 2.2% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MONITORING

Effluent limitations and monitoring requirements specified in the NPDES permit for HNL apply to discharges from White Oak Creek (Station 3), Melton Branch (Station 4), the 2521 Sanitary Treatment Plant and the 7904 Sanitary Treatment Plant. The permit specifies the parameters to be monitored, the limitations (if any) on these parameters and the type and frequency of sampling. Limits are in effect for Melton Branch and the 7904 Sanitary Treatment Plant. Limits for the 2521 Sanitary Treatment Plant become effective July 1, 1975, and those for White Oak Creek become effective July 1, 1977. The only parameter that exceeded the permit limits other than the previously reported chromium discharge in Melton Branch was the settleable solids in the 7904 Sanitary Treatment Plant discharge. To correct this situation, the sludge buildup was pumped out of the facility. Table 4 presents the results of other chemical monitoring

from White Oak Creek, Melton Branch, the effluent from White Oak Dam and from a point on the Clinch River up-stream from where White Oak Creek empties into the river. Although these parameters are not specified in the NPDES permit, these chemicals are monitored since they either represent large usages at the Laboratory or could become problems in the future.

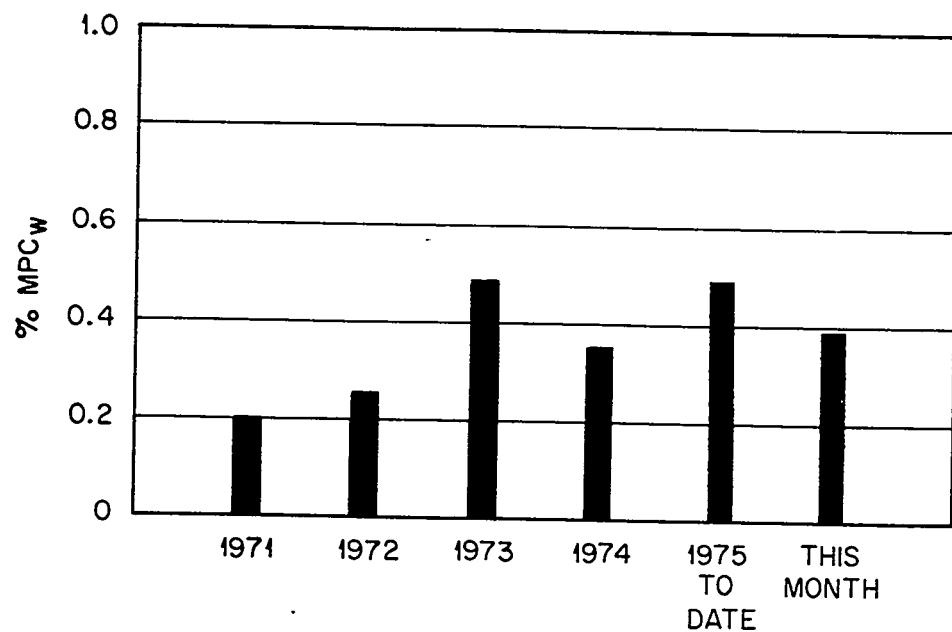


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

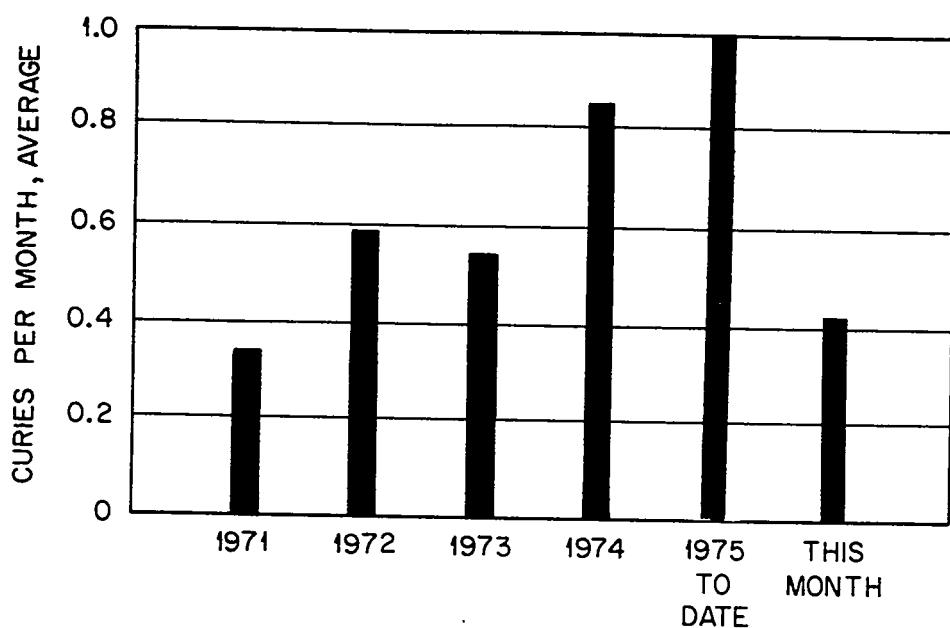


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

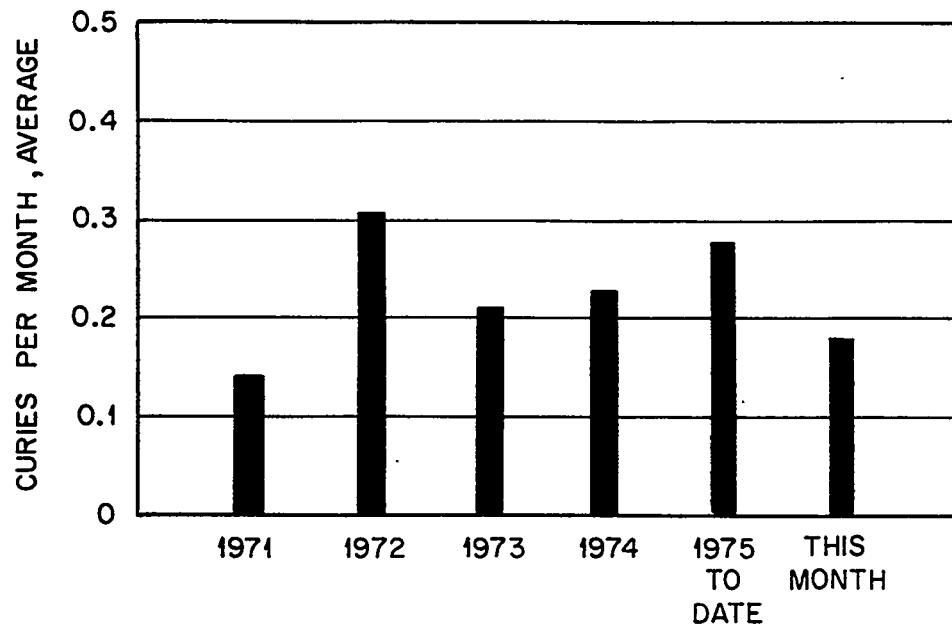


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

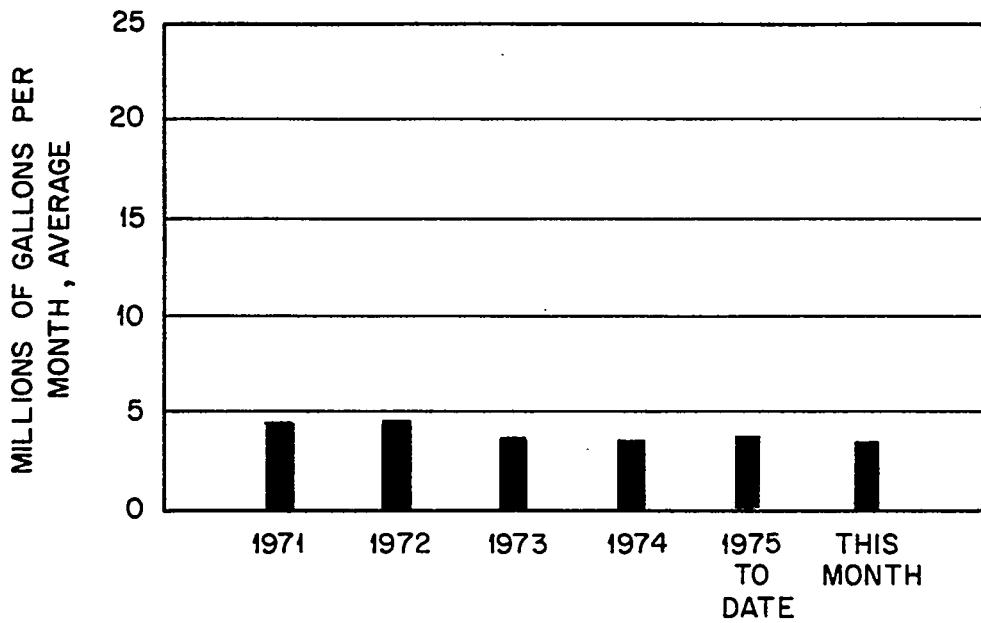


Fig 4. Process Waste Volumes.

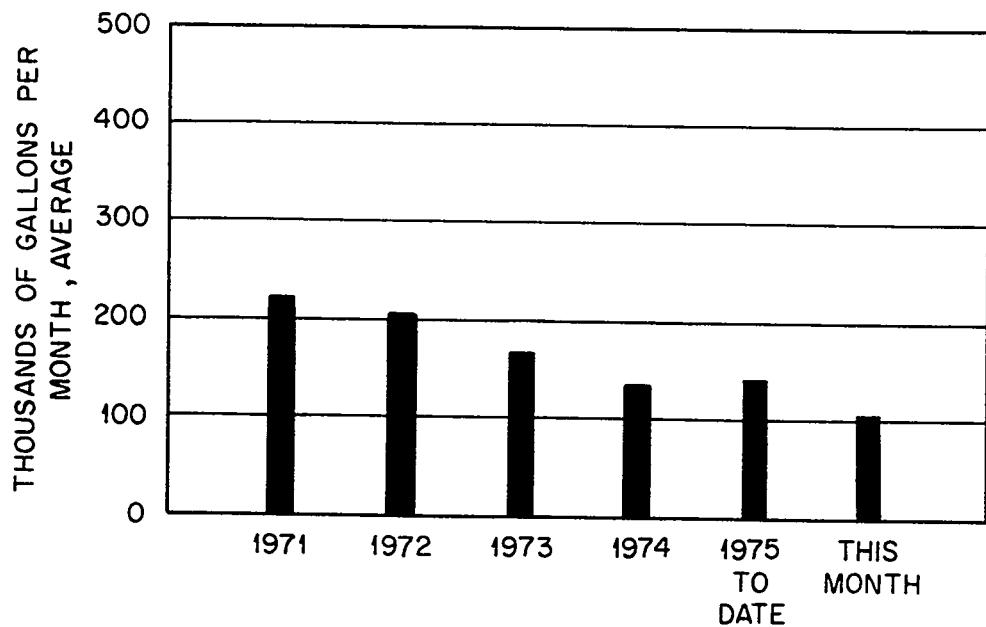


Fig 5. Intermediate - Level Waste Volumes.

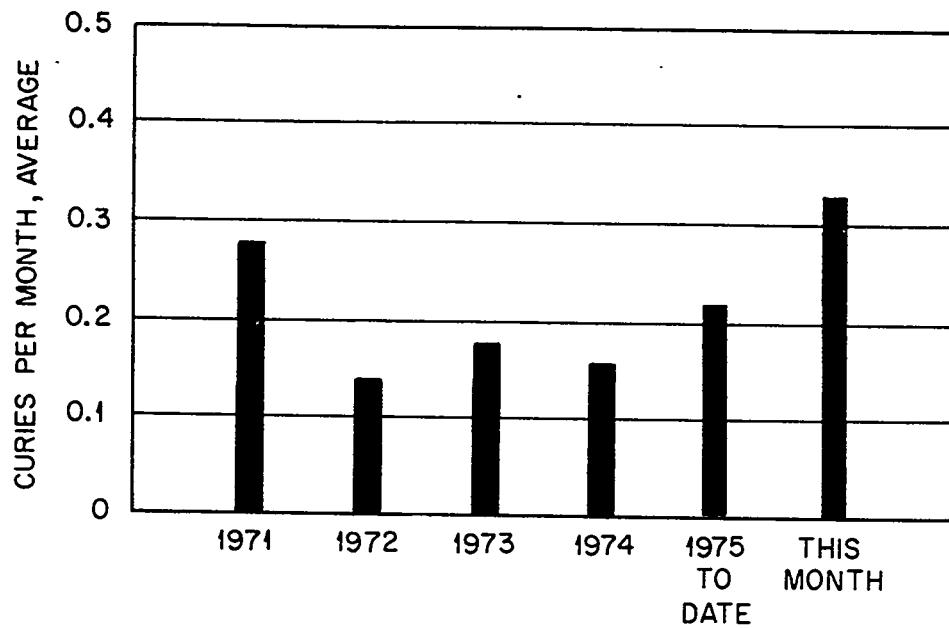


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

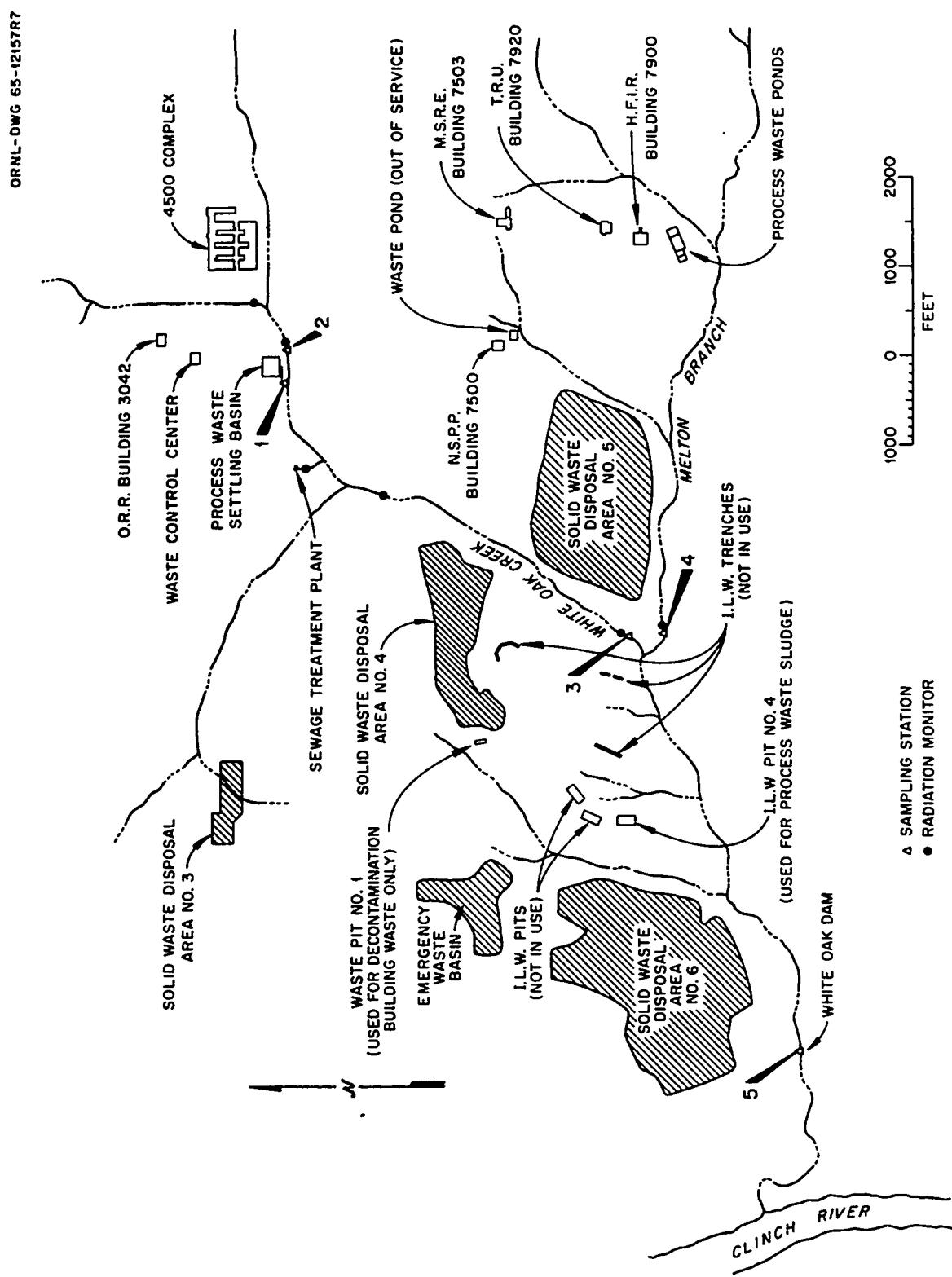


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.18	0.34
Miscellaneous discharges from east end of plant	2	\leq 0.02	\leq 0.11
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.24	0.50
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.19	0.47
Total discharge from all sources	3,4	0.43	0.97
White Oak Dam to Clinch River (Health Physics measurement)	5	0.48	0.58

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m ³ /ml ^a	Gross-Beta		Gross-Beta		Volume	
		Curies ^b	% of Total	Curies ^b	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	133.3	0.06	12.0	0.08	2.1		
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.17 ^c	34.0	0.07	1.8		
3. Reactor Operations (MH112)	5.9	0.03	6.0	0.96	25.0		
4. Buildings 3503 and 3508	< 1.4	< 0.01	-	0.32	8.3		
5. Buildings 3025 and 3026	1.5	< 0.01	-	0.35	9.1		
6. Building 3019	< 2.9	0.01	2.0	0.62	16.1		
7. Fission Products Development Laboratory	-	< 0.01	-	0.01	0.3		
8. Waste Evaporator, Bldg. 2531	5.8	0.02	4.0	0.56	14.6		
9. Building 3525	< 0.2	< 0.01	-	0.02	0.6		
10. Building 2026	< 0.4	< 0.01	-	0.15	3.9		
11. Tank Farm Drainage	52.4	0.21	42.0	0.70	18.2		

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity (Curies)	Filterable	
			Activity (Microcuries)	Particulate Activity ^b (Microcuries)
HRLAL	2026	0	0	0
Central Radioactive Gas Disposal Facilities	3039	0.31	143	
Radiochemical-Processing Pilot Plant	3020	0	1	
MSRE	7512	0	0	
HFIR	7911	0.02	17	
Total Activity in Gases Released at X-10 Site		0.33	161	
Isotopes Division - Y-12 Area		0.05(³ H)	4×10^{-1}	
Tritium Target Fabrication Building				
Building 4508 Ventilation Discharges				
Room 136			$< 3 \times 10^{-4}$	
Room 265			$< 7 \times 10^{-5}$	
Building 5505 Discharges				
Glove Box			$< 5 \times 10^{-4}$	
Hood			$\leq 8 \times 10^{-4}$	

^aActivity primarily ¹³¹I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

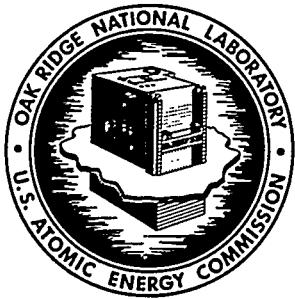
Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	0.017	2.3	0.18	< 0.005
Zn	0.1	0.02	0.06	0.12	< 0.005
P	1	0.30	0.35	0.16	0.005
NO ₃ as (N)	10	1.2	0.7	0.7	0.4
Hg	0.005	0.0011	c	0.0002	< 0.0001

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DATE ISSUED SEP 19 1975

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ORNL
CENTRAL FILES NUMBER

75-9-8

DATE: September 9, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1975

TO: Distribution

FROM: E. E. Beauchamp, G. J. Dixon and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamlin 7/10/96

Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1975, was 0.40% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.34% MPC_W and 0.03% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.92 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 214 gph.

	<u>Gallons</u>
Total volume generated	152,000
Volume transferred to evaporator	154,000
Tank Farm free space at beginning of month	407,000
Tank Farm free space at end of month	401,000
Evaporator concentrate returned to tank farm	8,000
Volume of concentrate available for hydrofracture (South Tank Farm)	75,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	32,500
Fission Products Development Laboratory	9,100
ORR and BSR	10,700
High Flux Isotope Reactor	35,000
Radioisotopes Processing Area	10,000
4500 Complex	7,800
Transuranium Processing Area	2,500

SHALE FRACTURE OPERATIONS

ILW injection number 14 was completed June 20, 1975. A total of 82,400 gallons of ILW was pumped into the existing slot at a depth of 822 feet. The waste was slurried with 569,000 pounds of blended solids. The waste contained 2,798 Ci of ⁹⁰Sr, 185 Ci of ¹³⁴Cs, 196 Ci of ¹⁰⁶Ru, 68 Ci of ⁶⁰Co, and 29,450 Ci of ¹³⁷Cs. The long-lived alpha concentration was 1.67 microcuries per kilogram of grout. The slot was overflushed with water at the end of the injection.

GASEOUS WASTE

The ORNL stacks discharged 0.28 Ci of ¹³¹I this month. The filterable particulate activities released during the period amounted to 305 μ Ci. Inert gases released from the 3039 and 7911 stacks averaged less than 2.0% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MONITORING

Effluent limitations and monitoring requirements specified in the NPDES permit for HNL apply to discharges from White Oak Creek (Station 3), Melton Branch (Station 4), the 2521 Sanitary Treatment Plant and the 7904 Sanitary Treatment Plant. Limits for the 2521 Sanitary Treatment Plant become effective July 1, 1975, and most of those for White Oak Creek become effective July 1, 1977. The only limits currently in effect for White Oak Creek apply to oil and grease and dissolved solids. The only parameter that

exceeded the permit limits other than the previously reported chromium discharge in Melton Branch was the settleable solids in the 7904 Sanitary Treatment Plant discharge. The cause for this is being investigated. Table 4 presents the results of other chemical monitoring from White Oak Creek, Melton Branch, the effluent from White Oak Dam and from a point on the Clinch River up-stream from where White Oak Creek empties into the river. Although these parameters are not specified in the NPDES permit, these chemicals are monitored since they either represent large usages at the Laboratory or could become problems in the future.

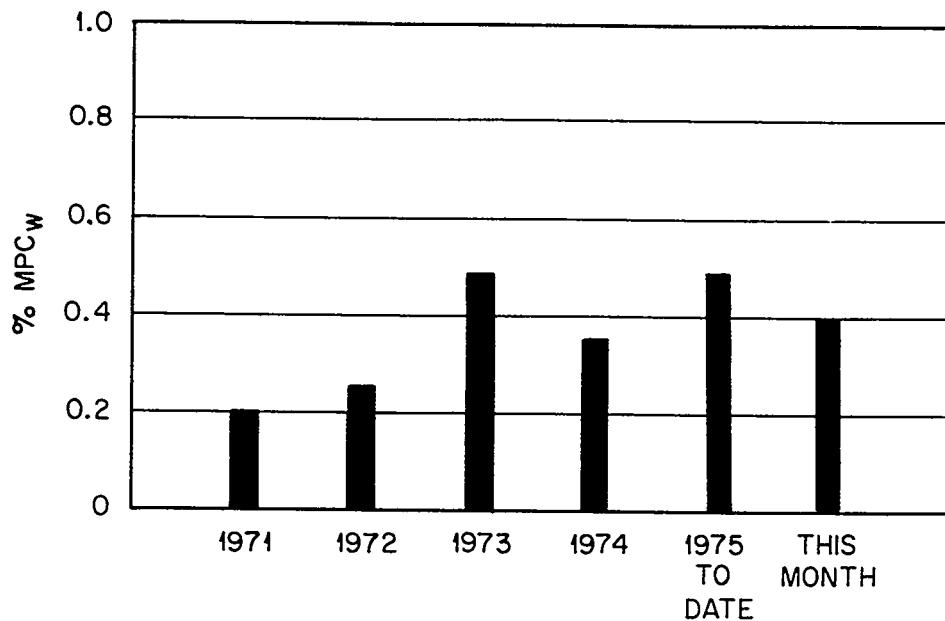


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

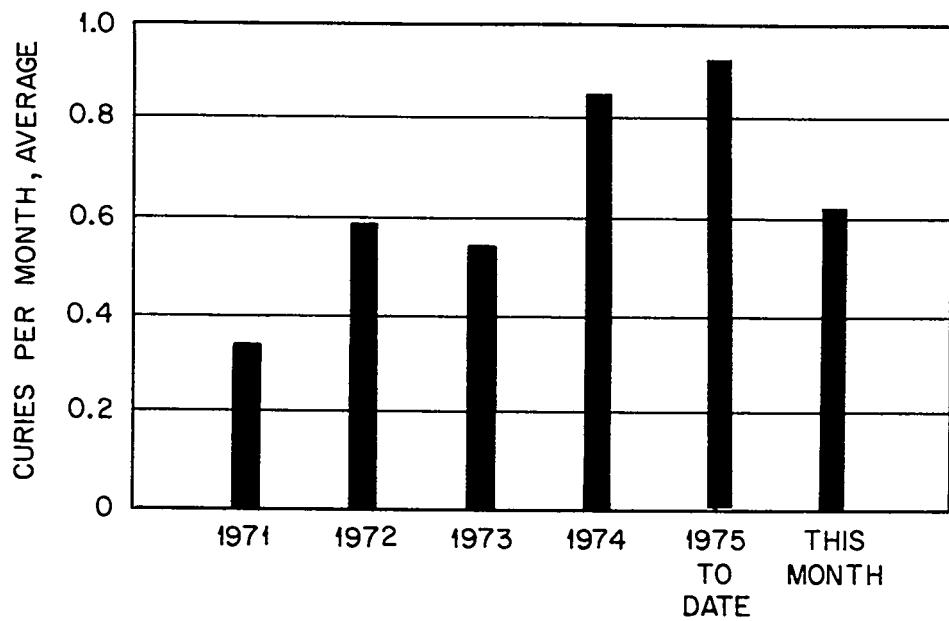


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

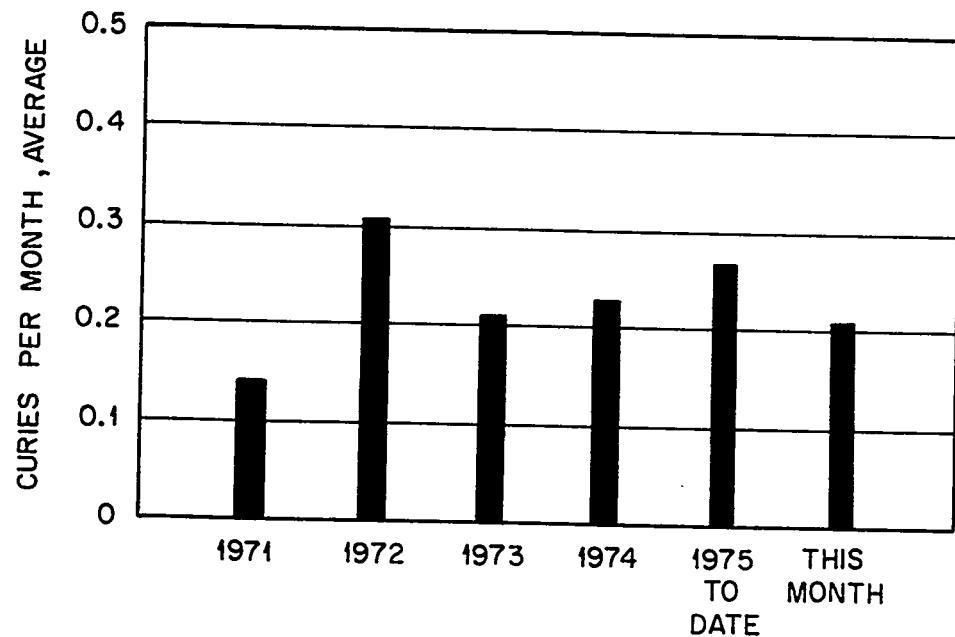


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

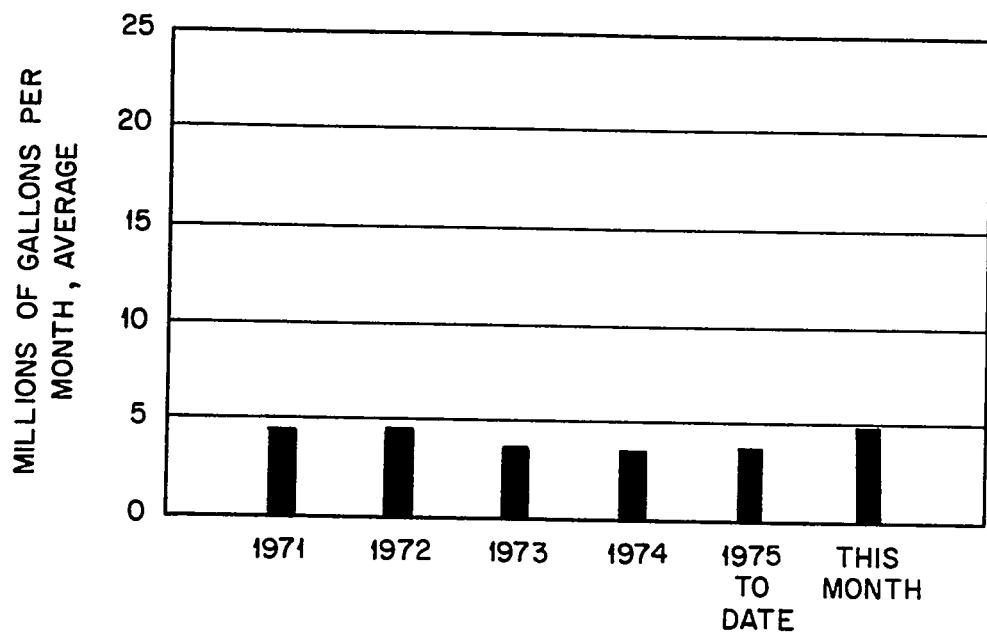


Fig 4. Process Waste Volumes.

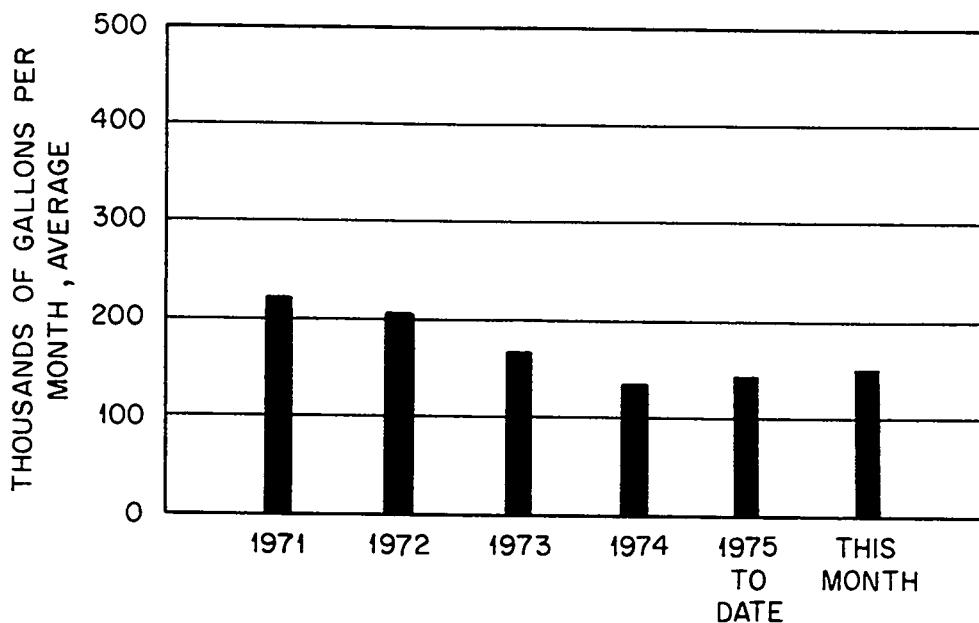


Fig 5. Intermediate - Level Waste Volumes.

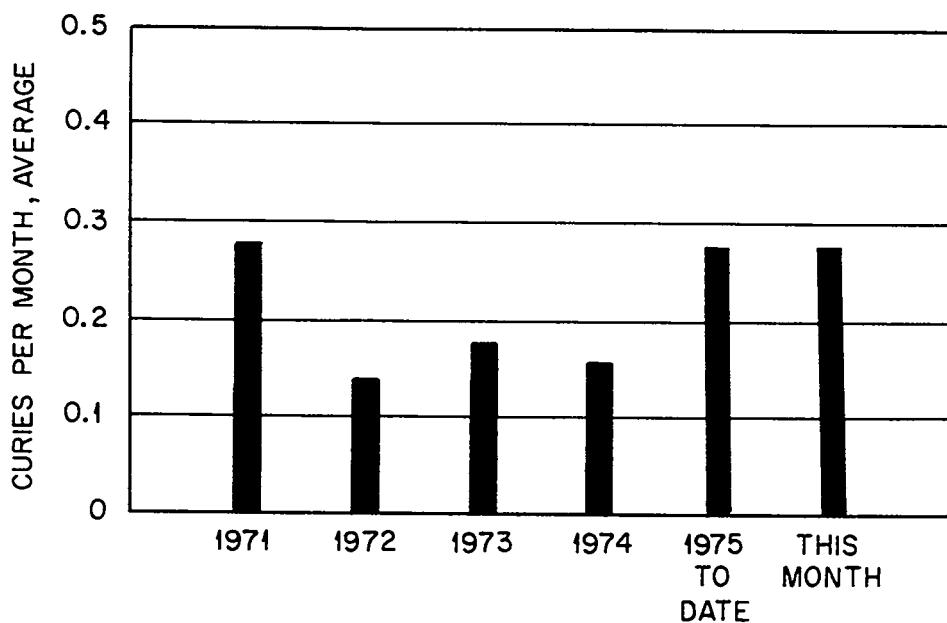


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

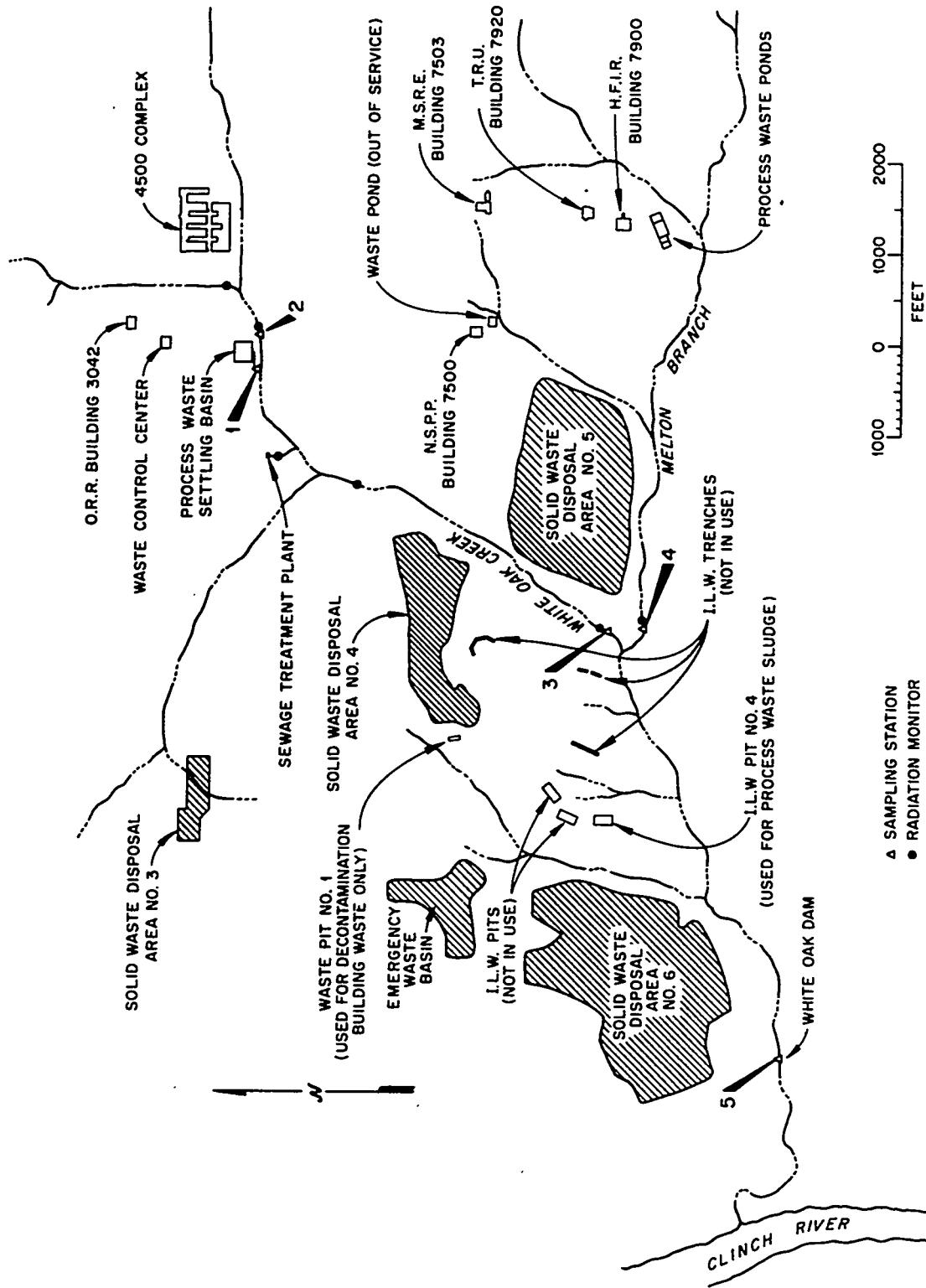


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta Curies ^b
Miscellaneous discharges from east end of plant	1	0.21	0.43
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.03	0.08
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.41	0.92
Total discharge from all sources	4	0.20	0.41
White Oak Dam to Clinch River (Health Physics measurement)	5	0.61	1.33
		10	0.68

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process Waste Discharges

	Activity Average c/m ³ /mla	Gross-Beta	Gross-Beta	% of Total	Million Gallons	% of Total
		Curies ^b	% of Total			
1. Radioisotopes Processing Area (MH234)	282.3	0.11	13.8	0.07	1.8	
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.22 ^c	27.6	0.14	3.6	
3. Reactor Operations (MH112)	5.7	0.03	3.8	0.86	21.7	
4. Buildings 3503 and 3508	< 1.2	< 0.01	-	0.33	8.4	
5. Buildings 3025 and 3026	1.8	< 0.01	-	0.36	9.1	
6. Building 3019	< 2.6	< 0.01	-	0.66	16.8	H
7. Fission Products Development Laboratory	-	< 0.01	-	< 0.01	-	
8. Waste Evaporator, Bldg. 2531	26.9	0.13	16.3	0.86	21.7	
9. Building 3525	< 0.2	< 0.01	-	0.02	0.5	
10. Building 2026	d	-	-	-	-	
11. Tank Farm Drainage	85.1	0.31	38.8	0.65	16.5	

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.^dThis manhole was out of service because of a leaking weir plate.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRAL	2026	0	-
Central Radioactive Gas Disposal Facilities	3039	0.27	260
Radiochemical-Processing Pilot Plant	3020	0	-
MSRE	7512	0	-
HFIR	7911	0.01	45
Total Activity in Gases Released at X-10 Site		0.28	305
Isotopes Division - Y-12 Area			4×10^{-1}
Tritium Target Fabrication Building	c		
Building 4508 Ventilation Discharges			
Room 136			3×10^{-4}
Room 265			7×10^{-5}
Building 5505 Discharges			
Glove Box			5×10^{-4}
Hood			8×10^{-4}

^aActivity primarily ^{131}I except as noted.

^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

^cThis discharge will be included with the July discharge.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard ppm	Sample Point				Clinch River
		3	4	5		
Cr	0.05	0.075	0.13	0.055	< 0.005	
Zn	0.1	0.02	<0.005	< 0.005	0.008	
P	1	0.23	0.12	0.13	0.01	
NO ₃ (as N)	10	0.7	0.6	0.7	0.5	
Hg	0.005	0.0008	c	0.0001	< 0.0001	

- a. These are the Tennessee Department of Public Health guidelines.
- b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.
- c. This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.11	0.19
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.03	<0.13
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.18	0.41
Total discharge from all sources	4	0.07	0.13
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.54
		0.14	0.24

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .